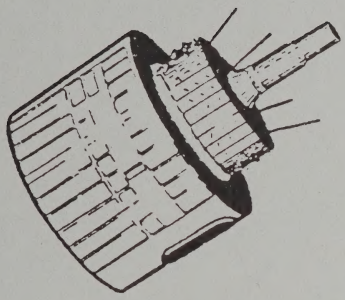
NEWSLETTER No. 21



REMOTE IMAGING GROUP

JUNE 1990

REMOTE IMAGING GROUP (R. I. G.)
NEWSLETTER No. 21 JUNE 1990

EDITOR & SECRETARY
Phil Seaford, G8XTW
14 Nevis Close, Leighton Buzzard, BEDS LU7 7XD
Tel: 0525 384419 7.30 pm to 9.30 pm Please

CHAIRMAN
Henry Neale, G3REH
Thornlea, Fishersgate, Sutton St. James,
Spalding, LINCS. PE12 0EZ
Tel: 0945 85353

MEMBERSHIP SECRETARY
All membership enqs/subs/applications
Des Watson, G3YXO,
Norton, Gote Lane, Ringmer, Near Lewes,
East Sussex. BN8 5HX.

TREASURER
Bob Leggett, G6KMM
Correspondence to Editors location for time being

RUSSIAN SATELLITE INFO. COORDINATION
Les Currington, G8LOK
14 Homerfield, Welwyn Garden City,
HERTS. AL8 6QZ
Tel: 0707 326058

EDUCATION & SCHOOL LIAISON
Colin Hall
120 Salisbury Road, Mosley, Birmingham B13 8JZ
Tel: 021 449 0006

EXHIBITIONS & RALLY COORDINATOR
Mike Coombs, G4YBB
Tel: 0530 243494

COMMITTEE: John Tellick Dick Boardman Gordon Fleming
Peter Newman Ian Gurton Ray Godden

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EDITORIAL & SECRETARIES PAGE

Its now the 24th July, 0100 Hrs and I am typing the last page to be written for the June issue of the Newsletter! I'm on the nth promise to Henry to have this in tomorrows post. I have given up apologising to the membership, who have been very patient, the reasons have not changed, and promise to get the remaining two newsletters in this year!! On to new things before this becomes a waffle page too.

First there is a new Meteosat schedule which will operate from 1st August, ie its on now. The popular D2's are now earlier thanks to improvements in the groundstation's computers in Darmstadt. The other difference (don't all write in) is the appearance of 'data' lines at the top of each frame for use by automatic receiving systems to identify what is being sent. More info in next issue.

The LNA's have all been sold and we do not plan to restock the kits until we have received sufficient enquiries from members that can justify a further 50, so write in (no money please) with sae stating your interest.

This issue will probably have a different feel to it as it is being produced by a new printer. The previous printer, Meridian, could not cope with the size of the previous issue during collating and trimming and had to use an external finishing house. That cost together with previously absorbed costs put the quote up by 70%. If the quality suffers with the new process and we have to revert to the offset process then subs will probably go up in January.

This issue definitely has a IBM PC flavour to it. A major set of reviews from Peter Dobson, and a total of three reviews for the PC-GOES package!

The RIG itself is finalising an arrangement to be the sole distributor of a new package from Timestep. The package contains all the functionality of previous offerings with the hardware interface reduced to a single PCB for the PC. By the time you read this it will have been launched at Woburn Rally. The pre-production interface has been around the committee and is currently with me for examination, see page 60 for more details.

In the meantime keep the copy coming in for the newsletter,

Phil RIG Secretary & Editor

Chairman's Waffle

Yet another newsletter drops through the letterbox and another 3 months or so have passed by! We are sorry that the last one was so late but most of the reasons were beyond our control. This also meant that no. 21 is also going to be late and we are time slipping before you even know it. The printing of no. 20 took 4 weeks to get the first copies out and considerably longer to finish the job. Henry did his bit reasonably quickly. Including those inserts was not difficult but never the less time consuming. To top everything off our printer has advised us that the price is being increased by 70% anyway! So the outlook is not good at present. Never the less we are pushing on regardless with 21 and hope that we can get it through your doors eventually. It's as bad as getting a reply from Phil! - no, that takes longer! In addition to the printing price increase the time taken to complete will increase to 17 - 20 working days - things ain't wot they used to be!

To try to alleviate some of these problems, several alternatives have been looked at to try to save time and money. Another printer had been asked to quote but it looks as if he will be less money than Meridian, but still a whooping price increase. There was also the possibility of using a photocopier and doing it ourselves. Not a job to be taken on lightly - imagine the collating - going around a table and picking up a sheet from each of 25 heaps - then stapling, folding and trimming if I've got time, 1500 times. We shall do our best what ever that is.

As mentioned in the last Chairman's Waffle, I attended the Rally at Harrogate and a nice time was had by all. I could have done with a bit more help so that I could have had a better look round myself but I did manage a cursory glance at most of the stands. It surprises me that even though you go to a different area, the same faces turn up, plus a few extras. The organisers were very helpful and if things go well you will probably see yours truly there again next year. My thanks to Bob Sansoni & Co for their valuable help in making it all possible. Mind you Bob will not have much spare time in future, because of the arrival of Elizabeth Anne to his household! All our congratulations go to Kate and Bob.

Whilst mentioning additions to families, we have an addition that answers to the name of Max.

For several years Ben a pedigree mongrel served our household to the best of his abilities, but alas as with all mortals his time came to an end with us. We had thought that we would manage without one until the winter, thus giving us a latitude of freedom. However, while my wife Joy was visiting her daughter Kay at Lincoln, she was accosted by Max. Joy and Kay were going shopping into Lincoln but on the way Kay realised that she had left her key behind. They were not far from the house but Joy waited for Kay to fetch it. In the meantime a lady and Max came along, and Max climbed onto Joy's knee and snuggled into her arm. Max was only about 12 weeks old but had just been rescued from a canal. He was very bedraggled but this lady took him home, dried him off and fed him. She already had a dog of her own and couldn't manage two and was taking this bundle of fur to the Police station, when she met Joy. Needless to say that after having just lost the affection of our faithful old friend Ben, Max was not long without an owner. We checked with the Police in case anyone had lost a puppy but nobody had and that after two weeks he would be ours if we wanted him. During that time he has been to the Vets to get his injections. The Vet said that they thought Max was a true bred Alsatian. We all know the size that they grow up to be! At least on the farm he will be able to get the exercise that a large dog needs.

After Yorkshire there was the Longleat Rally. My wife and I were invited to stay with Mike, Linda and Alex Meadows. Even though we left here soon after 5pm, we didn't arrive at the Meadow's Qth until very late, mind you getting lost between Bristol and Keynsham, courtesy of my wife's map reading, didn't help! We stayed for two nights and this allowed us to do a fair bit of software swapping and then to nip over to Salisbury Cathedral on the Saturday afternoon. Ted Heath obviously knew we were coming and arranged a musical interlude for us while we were there! Mind you he had to knock the band into shape and then decided to charge £25 per seat in the evening. We made our excuses and left!
I don't think that visiting my wife's ancestors haunting grounds at Stonehenge, en route to Shepton Mallet should be mentioned in this Waffle, otherwise I might not be able to go again (no wonder the camera went wrong!).

Isn't it surprising how fast the time flies when you are enjoying yourselves. Sunday came and we had to make an early start and get the show on the road. I think we just about made it and several of you called in. The most asked question was about certain PCB's. The answer to which will soon defeat even the Committee.

Perhaps we should included a standard apology with the Rally handout to save the vocal chords! Mike was of great assistance at the rally, allowing us both to have a look around. This work completed, we packed our gear back into the car, leaving about 5pm and arrived home, very tired, about 9-30pm. Our sincere thanks to Mike and Linda for their hospitality.

Our Welsh Reverend was in need of a 2M dish. Henry's Dish Transport system sprung into action! After a few telephone calls from James, a 2M dish was picked up from Timestep Electronics at 11am and arrived in Porthcawl at 20-00pm the same day. Not bad going! I left early (for Henry) to go to Wickenbrook to collect the same, but I did allocate one and a half hours for chin wagging etc and of course loading up! from thence on to Phils to await a synchronising pulse to travel on to Stratford upon Avon. Henry arrived there slightly early, but my instructions were Tesco's on the RHS, 2 miles out on the A34. Henry went to Texas on the LHS and 2 minutes out on the A34! Fortunately I had written the instructions down, and found my mistakes, changed location before the flying Reverend came over the horizon. We did have time for a quick liquid refreshment and the exchange of an accurately deformed sheet of aluminium before we reversed our direction of travel and returned home. James is now trying to get the awkward thing through his garage and onto his back lawn (nearly like getting in Henry's shack!). During the journey, I noticed small pieces of polystyrene being littered over the countryside. This was caused by a hole in the polythene bag of the packing material used, and was quickly rectified. The dish projected wider than the cab of the vehicle and I noticed that it seemed to hover in mid air at elevated speeds! A side product of this journey is that RIG now has 10 X 1.6M dishes at the attractive price of £48. They are located at Sutton St James and provide 4db more gain than a 1M version. The F/D ratio is nearly the same at 0.44, so the feed horn for the 1M dish will match it. They are difficult to transport but ways and means might be found (I got them all here). They are not going to be spread around the country.

Some of you might know that Les Currington is in the process of constructing equipment to receive primary data from Meteosat. He is well on the way and is already receiving data at poor signal / noise ratio. He is noticing the "Henry Diurnal Effect". In the early hours he gets relatively few data errors but at midday the signal all but disappears and the result is corrupt data! Henry strikes again!

Recently I have not been easy to contact on the phone. I don't think any of you have been unsuccessful in contacting me but I thought it advisable to give everybody the actual situation here. 0945 85353 is my home number and I'm possibly here till 9.00 am in the mornings. Sometimes I return home during the day and it has been known to catch me here. If I'm not here then all you get is no reply. My wife returns home mid to late afternoon and can usually give advice on best times to contact me. If however you need to contact me more urgently then 0945 85297 is my parents number where the farm is. My mother is usually the person that answers the phone and will advise on my movements. If you leave a message it should be short and simple. If I'm not there, but will be later, leave your telephone number and I will ring back at the earliest convenient moment. I usually have lunch at my parents (during school term time) between 12 and 12.30, which is also a good time to try. I normally return home about 5.00 pm and subject to what is on, I am there till bed time which is about 11pm. I do not mind having calls till 10.00 or even later. Harvest time is always difficult so you have to take pot luck then. I much prefer to have calls on any queries because it is much quicker and I don't have the hassle of putting pen to paper for a reply. Sometimes, however, only a letter will do.

A Laser with blue light output is getting nearer. I've mentioned them before but New Scientist, 16-6-90 page 36 reports that progress is being made at IBM research labs. By powering the usual IR Laser into a special crystal, this time potassium niobate, which frequency doubles the light! Efficiency in the past has not been very high but is now approaching 10% of the DC input. This increase in efficiency is due to a new optical configuration in which the IR light circulates within the crystal (for ever?) until it changes to blue light and emerges. I am advised by Graham Smith that new Crater Tubes are still available at moderate price, but their days are numbered now.

Recently I have had several enquiries about the Quad Loop Yagi. It seems that you have decided to make one because you didn't want the hassle of going through planning permission procedures. I don't want to discourage these moves but I would like to point out to you that you only need planning permission for something that is fixed. If it can be described as temporary and movable you should not need planning permission. You will have to check on your local authority's position, but remember that they only give you their own interpretation of the law and it might not be the correct position.

A 1M dish if fixed to a wall at substantial height probably needs planning permission. A 1M dish on a substantial stand with concrete blocks, stood on the patio does not, but it should be moved about to prove it is not permanent. These are only ideas but should be food for thought, but don't blame me for any run ins you have with the authorities!

I had a reply to my plea for a 2400 hz detector from Colin Schulz - Western Samoa, who lives near the top left hand side of the picture of New Zealand in the last Newsletter. The circuit plus letter, which will be included in the next issue, can detect the 2400 hz before you can yourself audibly. Instead of the dozen or so replies you thought I would receive, Colin , yours was the only one! I imagine that it will be included in several systems in the future to save on frustration.

While I was at Dave Cawley's he showed me his most recent product (what salesman wouldn't). This was a very attractive package indeed. It was called PCSAT II and consisted of a small half card that fitted into a PC slot from which it received its power, and a disk with the software on. All you have to do is feed in the audio from the weather satellite receiver. There are 3 preset pots just to set the audio levels and the audio is decoupled internally to give you and your PC some protection from nasties. Weather pictures are displayed on the screen of the PC to the maximums available for your system. Once stored these images can then be handled to alter the contrast or colours etc. The system is excellent on Meteosat signals and even has an animation system and HP LaserJet II print facility included. Polar orbiter images are good live and can be further enhanced later. This system is being reviewed at present and should be included later on in this Newsletter. I feel that this package will represent extremely good value for money which is why we are planning to take it on board. By the time you read this we will have hopefully demonstrated the package at the Woburn rally.

After that plug it only leaves me to wish you all the best till the next time and I hope that the next 3 months don't have the problems of the previous 3, and perhaps I can get some work type work done.

73's Henry

Best Wishes
Henry

WEATHER CHARTS ON THE YU3UMV FRAMESTORE

John Townsend, G4ILY

INTRODUCTION

At a recent RIG A.G.M. one member asked whether it was possible to modify the YU3UMV Frame Store to receive the pictures and charts sent out by the German Weather Service. These are transmitted by FSK on 134.2kHz., with a shift of about 360Hz. When received on SSB the tuning can be adjusted to give a frequency modulated audio tone.

A converter to process this signal and allow the pictures to be viewed with a frame store, rather than the FAX machine for which they are intended, was described by Knoeff in UKW Berichte 1985 part 2. This operated by demodulating the FM audio tone, filtering the resulting signal and using this to amplitude modulate a 2.4kHz. oscillator.

It seemed to me that a simpler approach, provided that a modification of the frame store was allowed, would be to use the demodulated FM signal to replace the demodulated AM signal produced by the input rectifier circuits of the original YU3UMV design. This also fitted in nicely with a wish to experiment with different post-rectifier filters as well as the design of an AM demodulator also using a Phase-Locked loop.

CIRCUIT DETAILS

The signal from the SSB receiver is filtered by a low-Q bandpass circuit constructed with a 741 operational amplifier. The filter is centred on 2.4kHz. with a 3db pass band between 1kHz. and 5kHz. Its purpose is to remove noise components above and below the desired signal frequency without affecting the spectrum of the frequency modulated audio carrier.

A second stage of amplification follows, this uses a 709 operational amplifier which has frequency compensation components chosen to maximise its slew rate whilst preserving high-frequency stability. This amplifier is operated as a limiter, and it is necessary to maximise its slew rate in order to obtain the best possible output square wave shape. When a 741 internally compensated amplifier was used in this position the results were significantly worse with more noise on the pictures resulting from interference signals in the receiver.

The signal from the limiter is used as the input to a Phase-Locked-Loop integrated circuit type NE565. The differential output from the PLL chip on pins 6 and 7 is amplified by another 741 op-amp. This amplifier stage has a high frequency roll-off above 1.5kHz. to reduce the demodulator output ripple.
The main LF Video filter in the frame store removes the rest of the ripple.

The components on pins 8 and 9 of the PLL chip are chosen to give a free running oscillator frequency of approximately 1.8kHz. This allows the black and white levels of the LF Video output to be at 0.25 volts and 1.5volts respectively, which matches the corresponding levels in the existing AM detector circuit on my frame store.
The overall output signal is taken from a potentiometer which allows its range to be set to match the frame store input requirements.

POWER SUPPLIES
The circuit was designed to operate from a +12 volt and -12 volt supply which I was already using to power the Frame Store boards. The +12 volts should be stable as it provides the bias for the 565 PLL IC and ripple and other variations here will affect the circuit operation. The -12 volts is only used to provide a supply to the op-amps and is much less critical. The -7.5 volt supply in the Frame Store board may prove satisfactory but it is limited in current capability and I did not try it since the stabilised -12 volt supply was already available.
The current taken from each supply is only a few tens of milliamps.

CONNECTION TO THE FRAME STORE
In the YU3UMV design I101 performs the functions of rectifier and filter. The filter section dealing with the demodulated LF Video signal has pin 14 as its output point. The circuit in this area of the PCB is shown in FIG 1a and the modified form in FIG 1b. You will see that the output filter circuit can now be used for either the original AM signal or the new FM derived signal by switch selection.

SETTING UP
You will need an audio frequency generator of some sort, I used the SSB rig itself and used the frequency calibration marker oscillator to generate a 1.8kHz tone. This had the advantage that it was exactly the same source as would supply the picture signals. An oscilloscope is also useful for checking.

With no signal applied to the input check that the output level of the input filter amplifier is within a few tens of millivolts of 0V. Do the same for the 709 limiter amplifier.

If all is well, apply the input signal and check with the scope that the signal at the output of the filter is not reaching the amplifier output limits and is reasonably sinusoidal.
If this is not the case reduce the input signal level, this should be in the region of 500mVolt peak-to-peak for best operation, although the circuit will work with signals of less than 100mV peak-to-peak.

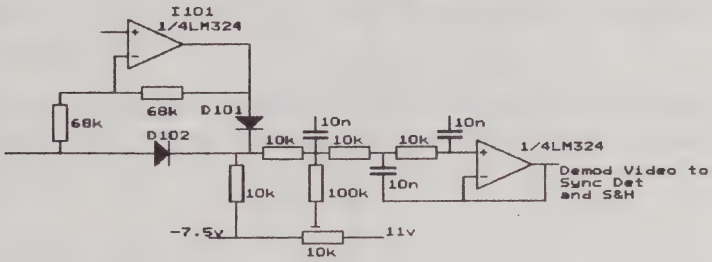
Now check that the limiter is functioning correctly. Its output should be an approximately square wave running to within a couple of volts of each supply rail.
The 1K potentiometer in the circuit on pin 8 of the 565 is now adjusted so that the output level from the second 741 is at 0V. As the potentiometer is adjusted, the output level should swing smoothly through zero. Tolerance variations may make it necessary to adjust the value of the capacitor on pin 9 of the 565 to obtain this condition.If you cannot set the output to zero volts check the circuit around the 565.
With the PLL set up correctly, adjustment of the input frequency between 1.8KHz. and 2.8Khz. should result in the output level moving between 0V and about +2.5 volts.
Now connect up to the Frame Store using the Low-Deviation output signal, with this output potentiometer set to maximum output. Tune in the signal on the SSB receiver. If a chart is being sent, as is most often the case, the audio tone will sound rather like someone scraping a rather musical comb. By careful adjustment of the tuning and of the output level to the frame store you should be able to resolve the picture.

ADDITIONAL COMMENTS
If you receive a negative picture, i.e. blacks and whites reversed, then you have tuned to the wrong sideband.
Because the method of modulation of the signal uses frequency to define the grey-scale level between white and black, any drift in the receiver tuning will show up as a gradual change in picture brightness. Since a change of 400Hz. corresponds to a complete shift from white to black a change of only a few Hz. is discernible. My own installation which uses a crystal controlled up-converter into an FT-707 operating at 10MHz. is only stable enough to produce really good pictures, which require no intervention to keep the tuning accurate, after several hours of warm-up.

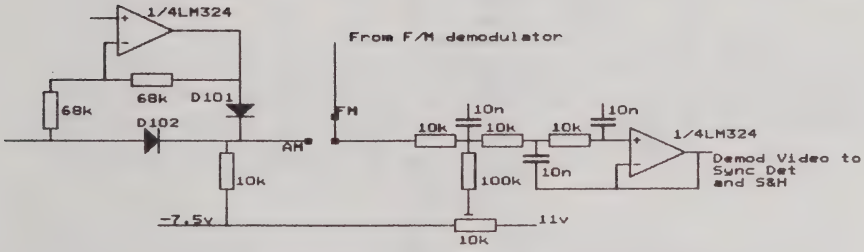
In order to tune the signal accurately I use an oscilloscope to monitor the demodulated signal. I can then adjust the tuning to obtain the correct black level. The oscilloscope Y channel must, of course, be D.C. coupled.

There are other signals around the Short-Wave bands which transmit fax and pictures. Some are transmitted at line speeds which do not fit any of the choices available on the frame store.

These cannot be resolved without further frame store modifications. There are also some transmissions which use a frequency shift of about 700Hz. The circuit described here will accept these but the output level change from black to white will be too great. Use the second output potentiometer to set the correct level shift and then select the appropriate one to send to the frame store.



a) Part of original AM Demodulator



b) Modification to allow AM or FM selection

Fig 1 Filter Circuit Modifications

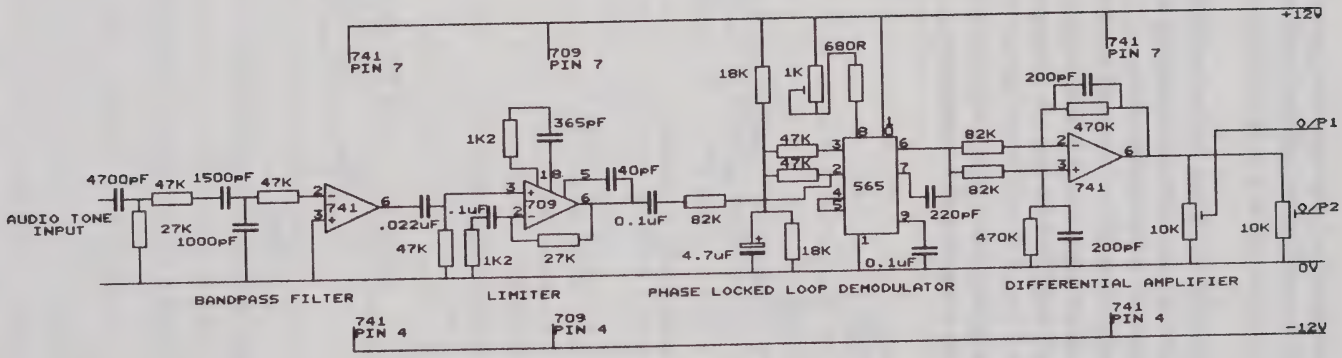


Fig 2 Circuit of the FM Demodulator

The Dish and how to get fried
by Brian Measures, G0HKR.

Saturday saw the temperatures reaching the lower twenties degrees centigrade. It was the day my new dish GaAsFET pre amp arrived. Complete with good breakfast and delaying the morning by reading the newspaper. I eventually scaled the garage roof to put the pre amp in place. Unscrewing the well self amalgamated taped installation and preparing it for the new arrival took time. The heat was quite fierce and a sortie back inside for the white hat to protect the bald plate brought a little welcome relief.

I sweated for a long time doing the job with the dish pointing in its 30 degrees elevation south direction during the midday heat. The result was fried Bry and an afternoon on the bed recovering from the heat with electrolytic drinks.

The sequel to this tale is to issue a word of caution to other like enthusiastic beings who, like me, might act first, think second and rue later. Therefore, I offer these red hot tips to those who work on their dish:

a) work in the shade whenever possible.

b) remember the dish collects the heat beautifully focusing it just at the point of the horn where you work so move it out of the direct rays of the sun.

c) I believe the Theorem of Reciprocity works for non ionizing radiation as regards UHF waves beamed down from the satellite and so I suggest you move the dish out of line of RF fire to avoid additional over heating.

WEATHER FAX
by Brian Measures

The reception of radio facsimile weather maps is a valuable adjunct for those who receive polar orbiting or geostationary satellite broadcasts for weather watching and meteorological purposes.

I receive my broadcasts via my HF transceiver taking the AF output to an ICS FAX-1 FAX/RTTY converter from which the signal is passed to an Epson compatible dot matrix printer for hard copy maps, black and white satellite pictures, Navtex, and METEO RTTY. In order to receive copy of these broadcasts I have to select lsb, tune 2.2 KHz up from the desired frequency for automatic non stop effortless recording.

As there are some 350 FAX stations to choose from I tend to use just two to assist me in my weather forecasting:

1. Deutscher Wetterdienst from Offenbach Meteo on 134.2 KHz

2. Uk Fleet Weather and Oceanographic Centre, Northwood on 4247.85 KHz and 6436.35 KHz.

I receive the 6 hourly surface analysis charts together with the 24, 48 and 72 hour surface prognoses. This enables me to attempt a very adequate forecast from my actual Meteosat-4 SDUS image data. It means that I do not need all the singing all dancing computer animation of past pictures because receiving actual charts based on field data together with my own weather station observations and Meteosat real time images I get the weather forecast correct at least 90% of the time. My wife's dry washing will attest to this!

Two books which are most useful to the Fax enthusiast are:

a) J. Klingenfuss (1989) "Guide to facilimle Stations" Klingenfuss Publications Tuebingen, West Germany.

b) Admiralty List of Radio Signals Volume 3. Published by the Hydrographer of the Navy, Taunton, Somerset.

The author supplied the following charts, but we only had space to print Chart 2:

Chart 1 Offenbach-
Surface Analysis with plotted data for 0600UTC 13 May 1990. 1:15,000,000 scale Polar Sterograpchic Projection

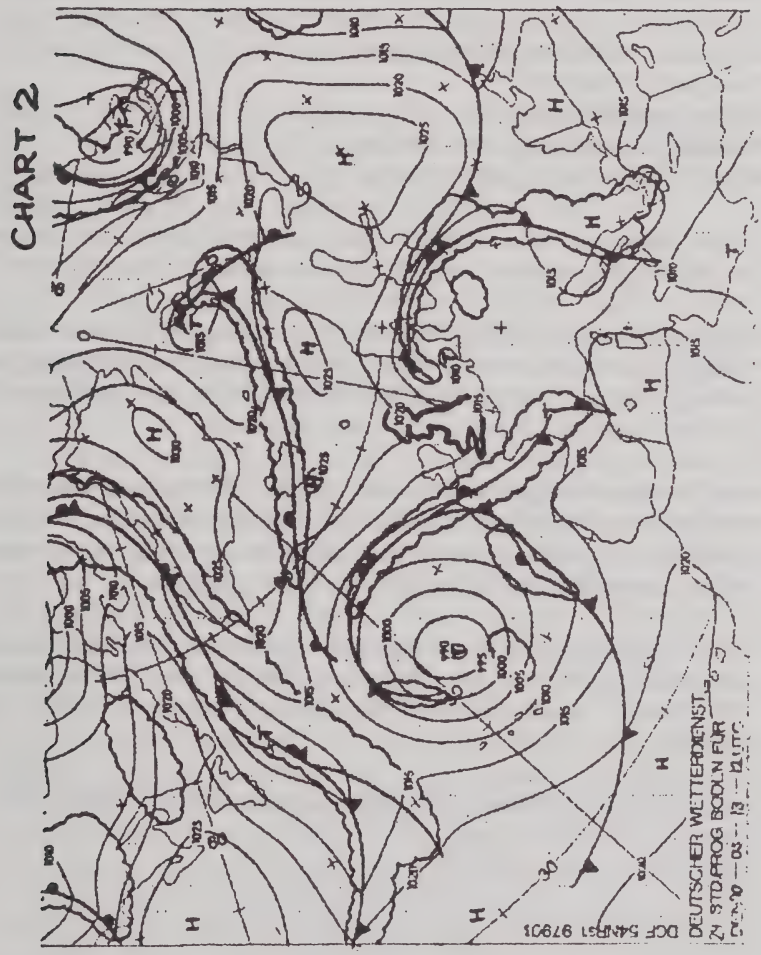
Chart 2 Offenbach- printed below
H+24 hr surface prognosis for 1200 UTC 13 May 1990 1:30,000,000 scale Polar Steriographchic Projection.

Chart 3 Northwood-
Surface analysis for 1200 UTC 17 May 1990. 1:10,000,000 scale. Lambert's Conical Orthomorphic Projection.

Map 1 Offenbach relay satellite picture. Meteosat-4 IR 1800 UTC 12 May 1990.

Map 2 Offenbach relay satellite picture. Meteosat-4 Vis 0730 UTC 13 May 1990.

This is the same chart (WEFA) as beamed daily from Meteosat-4 on channel A2 at 1902 UTC in slot 5.



IMAGING ON TH PC - 5 EQUIPMENT REVIEWS
by Peter Dobson

Over the last year or so I have been collecting information on software available for the IBM/PC. As I stated in a letter in the last issue of RIG, companies are now awakening to the high resolution graphics cards becoming available for the IBM/PC at home user and hobbyist prices.
I am sure we will see more programmes come on to the marketplace in the future.

The five programmes I have had a chance to look at so far are:

Dartcom's VGA software package.
Timestep's VGASAT.
Educa System's Digisat.
PC-GOES - a package from America.
MF4 - another package from America.

These packages have only been reviewable through the kindness of the following companies who allowed me access to the software.

Martelec Communication Systems for Digisat, I.C.S Electronics for VGASAT, and Dartcom, who went to the trouble of sending me a package through the post so that I could look at the operation of the package from the comfort of my own computer.

All of these packages offer a wide range of different facilities and in so doing vary considerably in cost. As always with these things you get what you pay for. For some people though some of the features of the more advanced packages may not be required.

To save space in the magazine I have put together a table summarising the key features each package has. The discussion that follows on each package highlights points which I think are of interest:

Let us start with the low cost packages and work upwards:

MF4.0 This was the first software I ever got for the IBM/PC (actually MF3.1). The software is written by Elmer W.Schwittek of Naples, Florida and he will supply directly to any one who wants a copy. The cost is approximately US$45.00. For this you get two disks, one containing the programme and the other containing some sample pictures. No hardware interface is provided with the package, but several circuits are included for home constructors in a comprehensive user's guide that comes with the software. Digitised APT and FAX signals are passed to the software either via one of the games ports or via the parallel port.

Elmer has written several versions of the software over the past two years or so. MF2.* was written for CGA video drives. MF3.* for EGA drives and MF4.* for VGA drives. I am sure there is one for Hercules cards too though I have not seen it.

Pictures are decoded into video RAM and stored at that resolution. Any system upgrade to a better video driver will require the purchase of the corresponding software to match the video driver. Elmer usually provides upgrades for approx US$15.00

The host computer itself needs no special features and the software should work on any IBM/PC or compatible. The operation of the software is totally manual (via the keyboard) and the operator must over see all aspects of picture reception and processing.
The decode timing is carried out through software execution time (sometimes called live code), as a result the parameters used to set the programme up for picture reception will change with the speed of the computer. RAM area for picture reception is also set by hand and if you get this wrong the system crashes. In my view this package is really for the person who knows a little bit about IBM/PCs and their internal workings. The software cannot be used to decode pictures recorded on tape.

The package I have is not capable of animating sequences. It is capable of providing hard copy (The quality of which is usually limited by the printer not the programme). I have been using an 8 pin dot matrix printer which gives quite respectable results from FAX pictures but can't really cope with the shades of grey in APT pictures. The package will currently only drive a dot matrix printer and it cannot cope with a laser printer or any other more advanced printer.

PC-GOES.
Is written by John E.Hoot of Software Systems Consultants, San Clemente, California. The package comprises of the software, an operators manual and a small interface unit which connects to the serial port (using the DSR signal).

It is interesting that Mr. Hoot also wrote a standalone package called PC-HFAX which, as you can guess, is for FAX image reception. The price of the PC-GOES package is approx.
£200.00 including the hardware interface unit, and £90.00 with another interface box for the Fax package.

The input to the interface is standard APT as obtained from any receiver. The interface AM demodulates the APT signal and then converts it to a frequency that is proportional to the instantaneous amplitude of the incoming signal. The software then sorts out what is going on by counting the number of DSR interrupts per unit time. Because the software operates this way it will only work from a live signal and a tape recorder cannot be used. Timing is set up in the computer through a hardware setup page and it takes a little while of trial and error to get the timing correct. Having sorted it out though, the timing parameters are saved to disk and used each time the programme is called. A tune screen is also available to calibrate the APT amplitude to the needs of the programme. Again, a little time spent tuning and tweaking the various parameters is well worth the effort for the return in picture quality achieved.

The package operates via the PC's video ram so pictures are only stored at the video driver resolution. If the system is upgraded at a later date no improvement in previously stored images is achieved. The software is available for EGA, VGA and Hercules drivers. Images can be captured automatically and stored to disk.

Much of the information on this package has come from a new RIG member, Paul Wynter of Brighton, to whom I am indebted. Paul has found a number of minor bugs that exist in the software. Having said that, John Hoot is about to release a new version of the software that addresses the problems outlined here head on. The reason they exist is that the software was written before the days that ATs became cheap. As a result, the software runs very well on the XT slogging along at 4.77MHz:

1) During picture decode the real time clock in the IBM comes to a grinding halt. This is OK (as far as PC-GOES is concerned!!!!) until you want to decode several Meteosat pictures against the clock. The first picture is correctly received but, thereafter, all subsequent timing is totally lost.
I have also found that the hardware real time clock is corrupted by this programme too!!!!!

2) A useful orbit prediction programme exists for polar satellites though loading the Kepler elements for this part of the programme is a real chore. The next version of the software will accept data files available from bulletin boards, such as TS Kelso (USA), directly and will update the Kepler elements from such BBSs automatically.

3) The print routine for PC-GOES is different to the print routine for PC-WEFAX. For some reason the WEFAX programme gives better output. So if you want a hard copy of a GOES image, output it via the WEFAX package!! Again, the updated software addresses this problem and good pictures will be obtained from both packages. I have to say that I have been using a laser printer with the package and have been getting very acceptable hard copy.

4) The WEFAX package will automatically start a picture but it will not automatically stop. The net result is that you cannot collect a series of FAX pictures without running out of RAM just at the wrong time. The new software corrects this fault allowing WEFAX pictures to be received against a fixed time schedule (just like Meteosat). Also on the WEFAX software I cannot get the package to set the IOC automatically from the start tone, so aspect ratios can be way out at times.

5) The current software will only store as many lines as is available on the screen. The next package will allow more than one screens worth to be decoded so that, for example, the polar pass can be decoded and then scroll can be used to view the bit that is of interest.

Other features of the package include: False colours, zoom by quadrant, and a limited animation routine. Animation is achieved by storing all the pictures you want in the animation and then running a separate software package. A little niggle I have is that geostationary satellites are received upside down and left to right. Whilst this can be corrected with two key strokes after reception, if you want to run an animation you have to go through every picture

and perform this operation to correct each picture. I think this package is more aimed at the polar satellites.

PC-WEFAX, the sister package to PC-GOES, is a good package and deserves a review of its own, maybe in a future RIG.

Digisat.
This package is available from Martelec Communication systems here in the UK. It costs around £150 + VAT and comes with a nicely built half size interface card that fits into any spare slot in the IBM/PC. This software operates in three modes: Geostationary, Polar, and Fax modes.

In Geostationary the package is very good indeed. It has a comprehensive dissemination schedule as part of the programme which can be edited by the operator if the schedule is changed. Selected pictures can be stored to disk either as individual high resolution pictures or at a lower resolution as part of an animated sequence. Several animated sequences can be compiled concurrently during the course of the day. There is no limit to the number of pictures you can store away to an animation sequence, but, as I found, hard disk space is gobbled up at an alarming rate. When replaying an animated sequence data is thrown at the video drive from the hard disk as fast as the system will let it. It is the data rate from hard disk which actually controls the speed of the animation.

The version of the software I looked at catered for EGA, VGA and EVGA (800x600x16) I understand that drivers for the Hercules card are in preparation as is a version of the software which will run with 64 shades of grey on VGA (800x600x64). I look forward to seeing this package.

For Polar and Fax operations I found the package more limiting. I could not zoom once a picture had been received, neither could I get the package to produce a hard copy for me. To get the interface card to accept Fax signals I had to AM modulate the discriminated FAX signal onto a 2.4KHz carrier. The new package will apparently be able to recognise FAX start and stop tones automatically.

Of all the packages discussed so far this is the first package that gets close to the picture resolution transmitted by Geostationary satellite. (800x800).

Two rather nice touches are included in this package. The first is a file containing 57 town or cities visible from Meteosat. When Meteosat pictures are received fully automatically the programme will overlay the picture with these towns and cities if so selected by the operator. The positional accuracy of these cities is remarkably good. The cities are stored in a file in Lat. and Long. and the programme sorts out which frame and whereabouts they belong. The second feature is that the programme will extract from the IR images the pixel value under each city and compile a list of likely weather conditions at each city based on these values. A bit of a gimmick perhaps but very nicely done.

Timestep's VGASAT.
Initially I had difficulty getting information on this package. In the end ICS proved to be the most helpful source. Being quite close to home I was able to go and visit them. The package is offered from ICS as a turn key system which includes Antenna, preamplifier, receiver, IBM/PC interface card software and a very comprehensive manual. The basic package comes to some £690. In addition to this there are two software upgrade packages. The first enables the system to make up animated sequences from Meteosat and the second is a VGA upgrade to improve the quality of the pictures received, both of which cost an additional £92. I asked Alan Clemmetsen of ICS if the software and interface card could be bought separately for those who already have receiving equipment. He told me he was unable to do this. I have since learned of another Timestep distributor who will sell these items separately. I only got to play with the basic package so I do not know much about the animation package.

The system will run on any IBM/PC with 640K of memory. A special Amstrad 1512 mode is available which makes full use of a rather unused graphics mode available on this type of PC. The VGA package I looked at accommodated 64 shades of grey or false colours on the screen at any one time. It supports four types of VGA card: Paradise, Tseng Labs, Video 7 and Sirrus chip sets. The literature I got also talks about the Trident chip set, but ICS will not support this due to 'an inherent specification limitation' with this card. The basic package will receive Geostationary images only. A NOAA upgrade is to become available soon at an extra cost.

I am not sure that the NOAA upgrade will cope with Russian Satellites. I rather suspect that it will not.

During picture decoding the software compresses the picture aspect ratio. At the end of a picture transmission the screen will show the full Meteosat picture of 800 lines compressed into 600 screen lines.
I am not sure whether this means that every fourth line of Meteosat transmission is thrown away or whether the data is all stored but only a compressed form of the data is shown on the screen.

The picture quality with this package is stunning. I very much liked the zoom feature in this software in which a zoomed area is presented to the operator just like a magnifying glass. The area of the picture outside the magnifying glass remains at the original picture size. The size of the magnifying glass can be controlled by the operator as can its position on the screen. In the zoom area the picture is 2:1. The magnifying glass can also be opened up to cover the entire screen. False colour operation is also possible with 64 colours available from an enormous base palette. The basic package allows only fundamental picture processing, ie zoom, false colouration, saving to disk and loading from disc. The animation package uses EMS memory for the animated sequences. The amount of EMS memory on the system will govern how many pictures can be put in the animation sequence. The basic package does not allow hard copy to be generated.

BAe/Dartcom VGA Package.
The package consists of a data acquisition card that plugs into a spare slot in your IBM/PC, six disks (each one formatted for 1.2M bytes) plus six disks of sample pictures, which David Wright of Dartcom had sent me and, finally, a hard backed folder which is getting on for an inch thick, giving all the operating details of the system. The original software was developed around the Rasterex TMS34010 graphics card (giving 720x512x128). Dartcom then decided to produce a sub-set of the software which would work with any VGA graphics card (giving 640x480x16). Dartcom are also working on an EVGA system which will support up to 256 colours or grey shades on the screen at once, depending upon the capability of the EVGA card used.

The software is dongle protected, and the dongle comes with the system, of course. I was bemused by the dongle protection scheme

adopted by Dartcom. The software will run without the dongle, but every now and again a warning message appears on the screen saying that the programme is being scrambled bit by bit. Eventually the software will crash!!! The package price is of the order of £700 to £800. Dave Wright tells me that Dartcom are considering producing a reduced version of the software which will be more akin to the likely needs of the RIG enthusiast at a price to match.

Hardware requirements: The software expects to find EMS memory otherwise it will not run. Luckily my system was arranged so that I could allocate memory as extended or expanded. I allocated 1 MByte of memory as expanded and the software ran OK. All picture files, including animation, are stored within 640K bytes. Two animation lengths can be set up, 4 frames and 16 frames. In 4 frame mode each picture is allocated 400x400 pixels, in 16 frame mode each picture is allocated 200x200 pixels. Dave tells me this was done due to the data update limitations on VGA graphics cards. The Rasterex version does not have these limitations.

The other feature embedded within the animation process is that in between each picture update to the graphics card, the colour weighting to each picture is also updated. From what I understand this is the feature that slows VGA cards down when updating pictures.
Regardless of the graphics card used individual pictures can be decoded and stored at full satellite resolution (each picture is 640Kbytes). As a result of this it is possible to make up animations of parts of a standard Meteosat frame rather than the whole frame. Using a macro feature, several animations can be compiled concurrently on specific Meteosat frame types.

With this package it would be shorter to list the things it cannot do rather than what it can do, but here is a taster: animate, zoom, false colour, invert (N-S correction), histogram analysis, contrast enhancement, hard copy, density slicing, 3-D projection -suitable for displaying synthetic aperture radar pictures, generation of TIFF files for export to Ventura or Pagemaker. The analytical tools available to the serious scientist are really exceptional. An auto expand feature is also included which expands out the contrast of a picture to the full screen resolution. Included in the package was a picture from Landsat (available from NRSC Farnborough and Dartcom). The picture looks really quite flat and uninteresting until the auto expand feature is used. Because Landsat has so many shades of grey available to it, expansion to VGA's 16 shades of grey

is no problem!!! Also included in the Rasterix version of the package is a paintbox utility which allows you to take portions of pictures and add or mix them with others.

Summary of facilities provided by each software package.

Function.	Dartcom	Timestep	Digisat	PC-Goes	MF4.0
Zoom	yes	yes	no	limited	limited
Pan (L/R)	yes	yes	limited	limited	limited
Scroll (U/D)	yes	yes	yes	soon	limited
Full screen	w/r	yes	yes	yes	yes
Windows	yes	no	no	no	no
adj. palette	yes 16*	yes 256	yes 16	yes 16	yes 16
slicing	yes	yes	no	no	no
Histogram	yes	no	no	no	no
Meteosat auto save	yes	yes(1)	yes	yes	no
Animation	16	16	Inf	limited	no
LEO predict	yes	no	no	yes	no
Meteosat schedule	yes	(1)	yes	yes	no
Hard copy	256	yes	no	8/L	8
Mouse drive	yes	no	no	no	no
Unattended operation(2)	yes	(1)	yes	yes	no
Aspect ratio	correct	no	correct!	no	no
Full picture on screen(4)	yes	yes	no	no	no
Anim Res.	400x400	300x400	640x350	video res	0
Max storage	800x800	800x600	800x600	video res	640x480
	x16*	x64	x16**	x16	x16
Prog size	252K	100K	308K	387K	113K
Modes	G,P	G,P(1)	G,P,F	G,P,F	G,P,F
Time date stp	yes	?	yes	no	no
Sig source	L/T	L	L/T	L	L

Notes:-

Windows	= Satellite picture displayed as a window in the screen with icons, and other information around the screen.
adj. pallet	= Number of user adjustable pallettes available.
w/r	= When required or selected by the operator.
(1)	= Only with upgrade package.
Inf	= Dependent on hard disk capacity only.
LEO predict	= Low earth orbit prediction routines.
8/L	= 8 pin dot matrix printer or laser printer.
256	= 4 print drivers from 8 pin matrix to 256 colour ink jet printer.
(2)	= For Meteosat reception.
!	= Correct at 800x600 resolution.
(3)	= Dependent upon video resolution 800x600 is closest.
(4)	= Meteosat picture.
Anim Res	= Animation resolution.
Max Storage	= Maximum resolution to which pictures can be saved.
*	= Soon to change to 256.
**	= Soon to change to 64.
G	= Geostationary.
P	= Polar.
F	= Fax.
L	= Live signal source.
T	= Tape signal source.

More information on these software packages is still coming in. Whilst I have done my best to show all the information I currently have on these products, there may be a couple of areas I have overlooked or misunderstood. If you know better please write to RIG and I will publish amendments and an update in the next issue for all to read.

Peter Dobson.
May 1990.

Editors Note on the author:
Peter Dobson works in the CCTV industry and has no financial relationship with any of the above organisations. He considers himself to be an independent consultant on IBM PC's & imaging and has provided advice and guidance to Martelec Communications in this role. He also helps out on the Martelec stand at rallies.

PC-GOES - A USER'S FIRST IMPRESSIONS
by Ian Sheffield

One of the (few) advantages of being a computer manager is being able to use fairly expensive hardware for extramural activities. With this in mind I decided to invest in the PC GOES system, which I purchased from Comar Electronics. This system is a WEFAX demodulator and display, with orbital prediction facilities for use on an IBM PC.

The hardware bit consists of a simple demodulator box (about the size of a packet of cigarettes), with an RS232 connector on one end, and a flying lead with small audio jack plug on the other. Software comes on either three 5.25 or 3.5 inch disks. A very comprehensive (approx. 90 pages) manual is also included.
After copying the floppies on to the hard disk on my Toshiba 3200SX plus VGA display, I started to work my way through the menu commands.

The main menu offers such things as Capture a picture, View a picture, Read or Write to disk, Orbital predictions, Hardware setup, and several more functions. Once one of these options is chosen, a further sub-menu allows detailed choices.

When it is desired to capture a picture, it is possible to invoke a "tuning display" which shows an oscilloscope type trace on the VDU, with horizontal bars indicating the present peak white and peak black levels. These can be preset or, by pressing the "A" key, the program will set them automatically on the incoming signal. The audio signal into the unit has to be at a fairly high level - I connected a lead in parallel with the loudspeaker output of my MAPLIN receiver. One small criticism of the automatic level setting is that with NOAA double visible and IR pictures, if the IR picture is bright, then the auto level sets itself just a bit too dark for the visible image. This is probably finger trouble on my part. It is possible to manually preset these levels, which I will experiment with later. Meteor images, being full width, do not have this problem (only the deadly pager). I have not installed a METEOSAT system yet, so that is untried.

Until I acquired this system, I was using the MAPLIN decoder and frame-store. They were quite acceptable, but I must admit that I was astounded by the increase in quality of the pictures as displayed on a VGA type VDU. The system can work on Hercules graphics, CGA, EGA, and VGA. Super VGA and above are not currently supported.

The available resolutions are:

HERCULES	1280x796 BLACK/WHITE (no greys)
CGA	1280x400 (3 SHADES) or 640x400 (4 shades)
EGA	640x350 or 640x200 (4 grey or 16 colours)
VGA	640x480 (16 grey or 16 colours)
	or 640x400 (256 levels)

Several printers are supported, both for picture dumps or orbital prediction print-outs. I was disappointed in the quality of picture printout obtained with a standard EPSON compatible printer, but this is a shortfall of printers, not really of the program. I have never seen a really convincing grey scale from a dot-matrix machine. What can be done is to convert picture disk files (using either the supplied utility which converts files into PCX format, or a separate utility such as PIZAZZ which converts anything on the screen into many formats), into a form which can be recognised by a more sophisticated package, such as a desktop publishing system, and then sent to a grey-scale compatible printer. I hope to experiment more with this later.

In the meantime, the best method is still to photograph the excellent quality images on the VDU.

Hardware setup was quite easy, consisting mainly of setting up two timing parameters to set the computer clock at precisely the same equivalent rate to the received signal, to make the picture square (ie not skewed across the screen). Note that this system relies on the signal and computers clocks running independently at the same rate - i.e. it does not use the sync pulses on the line scans. For this reason tape recorded signals will not stay stable, and all signals have to be received "live". Fortunately at VHF the Toshiba portable is as quiet as the grave! On a live signal any skew was minimal (once the timing had been set up).

The system will accept NOAA, METEOR, and GOES/METEOSAT type signals (NOAA two images or one), and various phasing controls are available to centre the image during reception. Image centering does not matter anyway, as it can be centred after reception when in the picture display mode.

The picture display menu allows all the goodies such as brightness variation, moving up/down/sideways/mirror/invert, and a 2x Zoom to any of 9 quadrants.

The picture can be saved to disk AFTER making any of these manipulations. One useful feature is that after capturing an image, if it has not been saved, the program warns you if you try to capture or retrieve another image. An image can be saved in its unmanipulated raw form, and can be replaced by a new version after centering or enhancement.

The orbital prediction section allows three main facilities, a real-time map display (NORAD-style) of the selected satellite positions, a real-time continuously updated table of positions, or a future prediction listing of selected satellites. I fed in (on MAY 17) the Keplers from the March 90 RIG newsletter, and the accuracy for the NOAAs and most of the METEORs was within a few minutes. The map can be accelerated to show where the paths are likely to cross, and both it and the tabular display will warn you if any crossing comes above your horizon. It is possible to set up an automatic schedule so that the system will capture pictures from any selected passes and store them to disk unattended. Station parameters, such as LAT/LONG/HEIGHT/TIME, can, of course, be defined using the Station setup sub-menu.

It is difficult to convey all of the niceties and detailed facilities found in this system, but suffice it to say that as a seasoned computer manager, having seen many application programs, I was quite impressed by the "cleanliness" of this system. The menus were logical, the program did not crash, the manual was excellent, and the pictures were (to a relative WEFAX novice) very good.

My only real criticism is not being able to use tape- recorded signals. I am lucky in that the computer I am using does not generate much interference. Other, cheaper, computers may not be so good. This method of operation is different to that which I had to adopt when using the MAPLIN framestore because it generated so much hash I could hardly hear anything. The MAPLIN system, however, worked quite happily off recordings, so there was no problem. It would also be quite expensive to assemble a PC-GOES system from scratch. As was pointed out in a recent newsletter, a PC with VGA would be at least £800, and the software is £200. Compare this £1,000 with the RIG framestore!! However, these days many people have computers (a lot of them PC clones), so perhaps the computer cost is not so important. I got the impression that the PC-GOES system might be available for other machines, but they would presumably have to be of a similar standard to a PC (AMIGA, MACINTOSH, maybe).

I paid approx. £200 for PC-GOES from COMAR Electronics, who must surely set standards for fast delivery. First a demo copy and then the purchased copy arrived the next morning after making phone-calls for each. The software originates from Software Systems Consulting, California, U.S.A.

Wanted

Can anybody supply any of the following,
please ring Don on 0283 68088:

Service Manuals for:

1 Electrohome mono monitor, type no. 191D612HC6
2 Ferguson portable TV type 3816
3 Amstrad stereo cassette deck Model 6000

Test leads for plug-in units of Solatron oscilioscope type CD1740R
If test leads not available, the 24 way Amphenol plugs and sockets to make up test leads,
(these are type number 26-159-24P and 26-190-24S)

B D Berman
Staffs

Wanted - Information

Apple Computers Inc

Info on an Apple badged TCM 200 printer produced by Trendcom, USA. It use 'Silentype' black image thermal paper.

Would appreciate any information, eg Specification, unit description, data, circuit diagrams.
Henry Neale, 0945 85353

PRODUCT REVIEW - PC GOES/WEFAX V2.1

by Peter Ingram

OVERVIEW

PC-GOES/WEFAX is a simple to install and use product for image capture and display of both polar orbiting (NOAA, METEOR) and geostationary weather satellites (Meteosat, GOES), polar satellite orbit prediction, on IBM type DOS based PCs. It is relatively low priced (but not cheap) at £173.04 plus VAT.

There are two components to any computer system, hardware and software, and PC-GOES provides enough of both to allow a PC or true compatible to display good quality on-screen pictures in colour or monochrome that may be saved to disk for retrieval later.

HARDWARE

The hardware side of PC GOES is remarkably simple. It consists of a small moulded plastic case that has a 25 pin male Cannon plug at one end and a 6 foot, two wire cable that terminates in a 3.5mm jack plug. Inside the case is a single chip to perform the analogue to digital transfer which has had its number ground off presumably to prevent illicit duplication and, amongst the other usual collection of resistors and capacitors, a small preset potentiometer which I found necessary to adjust but of which there is no mention in the manual. To access this pot., it is necessary to open up the box and probably invalidate the guarantee.

Hardware installation is straightforward enough. The 25 pin plug connects to the serial port of the PC (the box derives enough power to run from the PCs RTS and DTR leads). The 3.5mm jack plug connects to an audio socket on your existing receiver. That's it! Well almost, apart from twiddling the pot.

SOFTWARE

Installing the software is equally simple. The software is supplied on three, non-copy protected, 360Kb, 5¼" disks and will take up approximately 1Mb of disk space for the whole product with demo pictures for every type of display adapter. This can be cut down to about 170Kb on disk without losing more than the demo and external file format conversion programmes and files.

Menus offer choices in configuring PC-GOES to your particular PC. You can select your display adapter/monitor arrangement as well as which COMx: port to use on the PC. The manual and the

documentation both claim to support COM ports 1 to 4 but I was only able to make it work on ports COM1: and COM2: I know that COM3 and 4 work on my machine because I've used them before. You can re-configure PC GOES on-the-fly any time the menu is on-screen so making changes quickly is not too much trouble.

PC-GOES relies on synchronising the real time clock in your PC to the crystal clock on-board the satellite for line synchronisation timing. This needs some care in setting up as an error will result in a slanting picture. The manual explains this aspect well however and that helps.

Whilst easy to use, this package feels as if it came out of the 1970s because the menus are mostly of the slap-it-on-the-screen and let the user type a letter sort. The mouse is not used at all and the product has a very flat feel. This is not necessarily a minus point because it does its job well for all that. It is just that I have become used to PC applications that use the mouse and are highly interactive with the user. Maybe I've been spoiled by all these new toys.

There is a mini "PC 'scope" (no settable timebase) to set the incoming audio signal level correctly for both black and white. There is provision to handle 20 lpm (Meteor IR), 120 lpm (NOAA/Meteor) , 120 lpm half line (NOAA, visual or IR selectable) and 240 lpm (Meteosat/GOES) scans. I was unable to test geostationary satellite reception as I cannot, as yet, receive them at home. I am sure that PC-GOES will receive and display those as well as it does the polar orbiters. There is an autostart mode with a built in scheduler that adapts to polar orbiter or GOES mode, for unattended image capture and file saving for up to six passes each having, optionally, multiple images saved.

DISPLAY OPTIONS AND CAPABILITIES

Most display adapters and monitors are catered for in both monochrome and colour variants. You can select from CGA (640*400*4 shades and 1280*400*3 shades), Hercules (1280*796*3 shades), EGA (640*350*16 shades), VGA (480*640*16 shades) and VGA256 (400*320*256 shades) modes each of which has its own unique and mutually exclusive picture file format. The picture files occupy an impressive amount of disk space. The smallest, CGA, taking 64Kb and the largest, VGA256, occupying 256Kb per image.

Several video modes are provided. These are: Monochrome, Colour, Blue/Grey, User defined colours and black and white. Depending

upon personal choice and display adaptor/monitor capabilities, you can select a variety of tradeoffs between more grey scales/colour or more resolution. Each display mode file type is unique and cannot be displayed by another which is a bit of a pity. However, you can swap the picture left/right and top/bottom plus left/right, up/down panning, lighten, darken, switch and define colours/shades, invert colours/shades, zoom on one of 9 screen regions, fix the zoomed frame as the current picture and save that independently of the original image. This is all pretty useful stuff within one single programme.

You may also print the pictures on one of several supported printers which include most of the popular Epson dot matrix products, the IBM Proprinter range and the HP Laserjet, HP (colour) Paintjet printers. For most of these, you can set both high and low resolution copies.

There's a tracking and prediction module too. It displays a map of the world in monochrome CGA mode and slowly flips between known (to it) polar orbiting satellites displaying their current orbit lines on-screen in real time. You can Add satellites, Modify the Kepler elements of, Delete, Set the time, Report on, any of this as well as telling the module your own station details of latitude, longditude, elevation, time from GMT, etc. All this information is stored in various disk files. PC-GOES came with Kepler data that is about 3 months old and it knows about NOAA and some of the later Meteors. Quite enough to get you started. Most of these modules will permit redirection to the printer or a files as well as on-screen display. The obvious exception to this is the graphical real-time world map.

Two external utility programmes are supplied with the package. One converts PC-GOES files to the PC Paintbrush .PCX file format and another that will animate a series of images. This last programme has a limited command parser and will accept a pre-prepared script file. I have the feeling that this is really for exhibition displays at shows, etc. rather than for animation of pictures.

One current drawback of PC-GOES is the impossibility of taping images and successfully restoring them to the screen from tape. I found that I was only able to capture pictures in real time. All of my attempts to display images taped on a good quality cassette deck have, to date, failed displaying a wiggly, curving line from top to bottom of the screen where the NOAA sync. and telemetry data fields should show as ramrod straight verticals. I am, an admitted novice at

this whole game but, a phone call to COMAR Electronics (the UK distributor) confirmed that storing to tape is not a valid option with the current release (V2.1) of the software. Another phone call to the vendor in California revealed that taping the live signal on a VCR with an already recorded tape whilst using "audio dub" would correct the problem and allow usable taped copy. A test confirmed that this is true and it now works. I now switch my PC off whilst receiving images, which reduces interference, and then replay and display the images later.

MANUAL

The manual provided with PC-GOES is quite good but not first class. However, it does contain all the necessary and relevant information to correctly install and use PC-GOES as well as a short, though rather American oriented, explanation and tutorial of the weather satellite subject for beginners even going down to construction details of a simple dipole antenna.

SUMMARY

I tested, to a limited extent, PC-GOES on a variety of PCs having various hardware configurations. PC-GOES ran successfully on my 10MHz 286/VGA machine, my Toshiba T1000 (one of the originals), My 25MHz 386 at the office and on my son's 8MHz XT clone. I also briefly ran PC-GOES on an Amstrad PC1512 that had been upgraded to 640Kb of memory. The product showed no idiosyncrasies at all on any machine.

PC-GOES originally comes from Software Systems Consulting on the West coast of the USA. The UK suppliers are:

COMAR Electronics,
1A, Birmingham Rd,
Cowes,
Isle of Wight, PO31 7BH

Tel: 0983 200308

Price: £173.04 plus VAT

Editor's Note:

And now also supplied by Martelec Communications

Beginners Guide, Part I
by Peter Ingram

It was the end of 1987, and we had heard that television by satellite direct into your home was possible. "I'd like the BBC, dear." admitted my wife. We live in Switzerland, you see. Our view of the Alps to the south was now going to provide us with TV pictures as well as a nice view. Life was good, uncomplicated.

That's how it started. Deceptively simple, really. I installed a 1.5 metre steerable dish and can now receive perfect BBC TV Europe transmissions. Wife is happy. Only took 18 months to get completely right. Not bad eh? Even after all these years away from engineering, I can still hack this stuff.

Last Christmas, I buy a Maplin weather satellite reviewer because the idea of obtaining my own weather satellite pictures appealed and, after all, I'd already installed a dish for TV. This is going to be "easy and just for fun, dear." I told the wife.

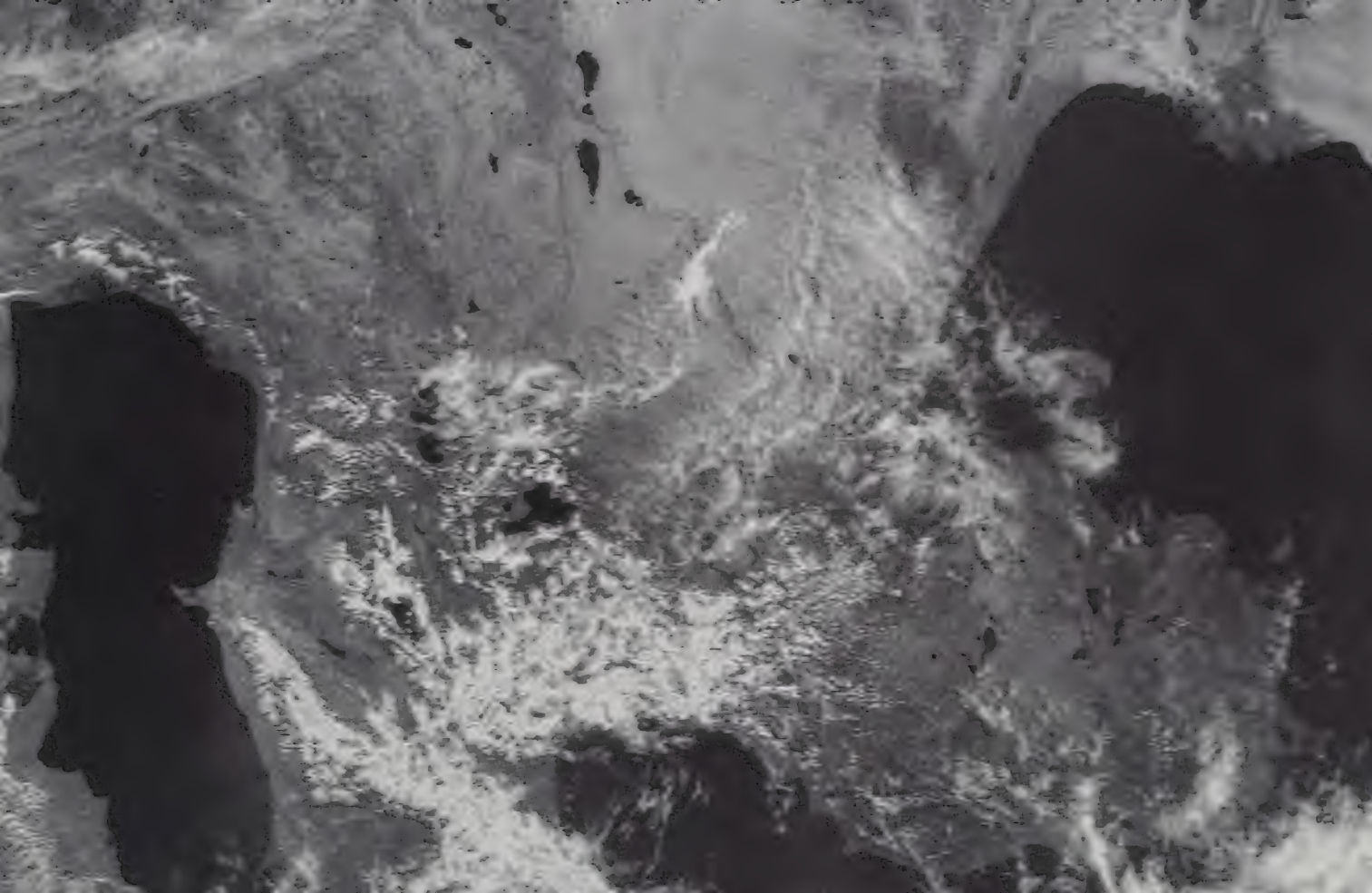
I bought a Maplin kit because it was the only one I had ever heard of. There was a picture of it in their catalogue. Looked a simple piece of kit too. Easy to build they said and it was too, requiring more mechanical skill than electronic to assemble. Making up the crossed dipole aerial was a similar experience. My six year old son got some of the resin in his hair just before going to bed. My wife was not, as they say, best pleased.

The setup worked almost immediately after powering up. This was the day after Boxing day. Piece of cake, this weather satellite stuff!

No satellites. The receiver produces "tunable crackles" with annoying reliably. Wife comments that I look "a bit peeky". I reply that this is normal for a man who has had no practically no sleep between Christmas and New Year.

The first signal came in on December 28th at 16:18 GMT it lasted for 5 heavenly (no pun intended) minutes. It is the first entry in my log. "What's that silly bleeping noise?" says you-know-who when she first hears what I now know to be one of the Meteor satellites. I refrain from commenting and fall into a deep sleep.

I had heard that these things whiz around the earth once every 100 minutes or so. So, fire up the Taiwanese AT clone, crank up



CHANNEL A2 - 1694.5 MHz VALID FROM 01 AUG 90

GMT	HH	12			15				18				21			
MM	CH	A1	CH	A2	CH	A1	CH	A2	CH	A1	CH	A2	CH	A1	CH	A2
2	C02	24	AIVH	24	C02	30	AIVH	30	D1	36	AI	36	D1	42	AI	42
6	C03	24	..	..	C03	30	..	..	D3	36	..	..	D3	42	..	..
10	D1	24	..	..	D1	30	..	..	D4	36			D4	42		
14	D3	24	DTOT	24	D3	30	DTOT	30	D5	36	DTOT	36	D5	42	DTOT	42
18	D4	24	CTOT	24	D4	30	CTOT	30	D6	36	ETOT	36	D6	42	ETOT	42
22	D5	24			D5	30			D7	36			D7	42	ATEST	0
26	D6	24			D6	30			D8	36			D8	42	..	..
30	D2	25	BIV	25	D2	31	BIV	31	D2	37	BIV	37	D2	43	BIW	43
34	C02	25	AIVH	25	C02	31	AIVH	31	D9	37	AI	37	D9	43	AI	43
38	C03	25	..	..	C03	31	..	..	D1	37	..	..	D1	43	..	..
42	C3D	25	..	..	C8D	31	..	..	D3	37	LY	37	D3	43	LY	43
46	C2D	25	LY	25	C9D	31	LY	31			LR	37			LR	43
50	C1D	25	LR	25	D3	31	LR	31			WEFA	5				
54	D1	25			D1	31					..	..				
58	D2	26	BIVW	26	D2	32	BIVW	32	D2	38	BIVW	38	D2	44	BIW	44

GMT	HH	13			16				19				22			
MM	CH	A1	CH	A2	CH	A1	CH	A2	CH	A1	CH	A2	CH	A1	CH	A2
2	C02	26	AIVH	26	C02	32	AIVH	32	D1	38	AI	38	D1	44	AI	44
6	C03	26	..	..	C03	32	..	..	D3	38	..	..	D3	44	..	..
10	D7	26	..	..	D7	32	..	..	E1	38						
14	D8	26	LZ	25	D8	32	LZ	31	E2	38	LZ	37			LXI	43
18	D9	26	AW	26	D9	32	AW	32	E3	38	AW	38			AW	44
22	D3	26	..	..	D3	32	..	..	E4	38	..	..			..	..
26									E5	38						
30	D2	27	BIV	27	D2	33	BIV	33	D2	39	BIV	39	D2	45	BIW	45
34	C02	27	AIVH	27	C02	33	AIVH	33	D1	39	AI	39	D1	45	AI	45
38	C03	27	..	..	C03	33	..	..	D3	39	..	..	D3	45	..	..
42	D1	27	..	..	D1	33	..	..	E6	39						
46	D3	27			D3	33			E7	39						
50	C1D	27	LXIV	25	C1D	33	LXIV	31	E8	39	LXIV	37				
54	C2D	27	..	..	C2D	33	..	..	E9	39	..	..				
58	D2	28	BIVW	28	D2	34	BIVW	34	D2	40	BIVW	40	D2	46	BIW	46

GMT	HH	14			17				20				23			
MM	CH	A1	CH	A2	CH	A1	CH	A2	CH	A1	CH	A2	CH	A1	CH	A2
2	C02	28	AIVH	28	C02	34	AIVH	34	D1	40	AI	40	D1	46	AI	46
6	C03	28	..	..	C03	34	..	..	D3	40	..	..	D3	46	..	..
10	C3D	28	..	..	C1D	34	..	..			AW	40			AW	46
14	C4D	28			C4D	34					..	..			..	..
18	TEST	0	ADMIN	0	ADMIN	0	TEST	0	TEST	0	ADMIN	0	ADMIN	0	TEST	0
22																
26																
30	D2	29	BIV	29	D2	35	BIV	35	D2	41	BIW	41	D2	47	BIW	47
34	C02	29	AIVH	29	D1	35	AI	35	D1	41	AI	41	D1	47	AI	47
38	C03	29	..	..	D3	35	..	..	D3	41	..	..	D3	47	..	..
42	C5D	29	..	..	E1	35							E1	47		
46	C6D	29	WEFA	4	E2	35					WEFA	6	E2	47		
50	C7D	29	..	..	E3	35					..	..	E3	47		
54	CTH	0							CTH	0						
58	D2	30	BIVW	30	D2	36	BIVW	36	D2	42	BIW	42	D2	48	BIW	48

SUPPRESSION DUE TO SEASONAL UNDER ILLUMINATION

NOAA '10'

PERIOD 101.2111330549675 MINS, INCR 25.30332920060027 DEGREES

1/08	181	07:34	30/08	343	18:21	28/09	353	19:01	27/10	186	07:53
1/08	333	17:41	31/08	185	07:51	29/09	347	18:38	27/10	338	18:00
2/08	352	18:59	31/08	337	17:58	30/09	190	08:08	28/10	332	17:37
3/08	346	18:36	1/09	331	17:35	30/09	342	18:15	29/10	352	18:56
4/08	189	08:06	2/09	351	18:53	1/10	184	07:45	30/10	346	18:32
4/08	341	18:13	3/09	345	18:30	1/10	336	17:52	31/10	189	08:02
5/08	183	07:43	4/09	188	08:00	2/10	330	17:29	31/10	340	18:09
5/08	335	17:50	4/09	339	18:07	2/10	355	19:10	1/11	183	07:39
6/08	354	19:08	5/09	182	07:37	3/10	350	18:47	1/11	335	17:46
7/08	349	18:45	5/09	334	17:44	4/10	344	18:24	2/11	354	19:05
8/08	343	18:22	6/09	353	19:02	5/10	186	07:54	3/11	348	18:42
9/08	185	07:52	7/09	347	18:39	5/10	338	18:01	4/11	343	18:18
9/08	337	17:59	8/09	190	08:09	6/10	181	07:31	5/11	185	07:48
10/08	331	17:36	8/09	342	18:16	6/10	332	17:38	5/11	337	17:55
11/08	351	18:54	9/09	184	07:46	7/10	352	18:56	6/11	331	17:32
12/08	345	18:31	9/09	336	17:53	8/10	346	18:33	7/11	351	18:51
13/08	188	08:01	10/09	330	17:30	9/10	189	08:03	8/11	345	18:27
13/08	339	18:08	10/09	355	19:11	9/10	340	18:10	9/11	187	07:57
14/08	182	07:38	11/09	350	18:48	10/10	183	07:40	9/11	339	18:04
14/08	334	17:45	12/09	344	18:25	10/10	335	17:47	10/11	182	07:34
15/08	353	19:03	13/09	186	07:55	11/10	354	19:05	10/11	333	17:41
16/08	347	18:40	13/09	338	18:02	12/10	348	18:42	11/11	353	19:00
17/08	190	08:10	14/09	181	07:32	13/10	343	18:19	12/11	347	18:37
17/08	342	18:17	14/09	332	17:39	14/10	185	07:49	13/11	190	08:06
18/08	184	07:47	15/09	352	18:57	14/10	337	17:56	13/11	341	18:13
18/08	336	17:54	16/09	346	18:34	15/10	331	17:33	14/11	184	07:43
19/08	330	17:31	17/09	189	08:04	16/10	351	18:51	14/11	336	17:50
19/08	355	19:12	17/09	340	18:11	17/10	345	18:28	15/11	330	17:27
20/08	350	18:49	18/09	183	07:41	18/10	187	07:58	15/11	355	19:09
21/08	344	18:26	18/09	335	17:48	18/10	339	18:05	16/11	349	18:46
22/08	186	07:56	19/09	354	19:06	19/10	182	07:35	17/11	344	18:23
22/08	338	18:03	20/09	348	18:43	19/10	333	17:42	18/11	186	07:52
23/08	181	07:33	21/09	343	18:20	20/10	353	19:00	18/11	338	17:59
23/08	332	17:40	22/09	185	07:50	21/10	347	18:37	19/11	332	17:36
24/08	352	18:58	22/09	337	17:57	22/10	190	08:07	20/11	352	18:55
25/08	346	18:35	23/09	331	17:34	22/10	342	18:14	21/11	346	18:32
26/08	189	08:05	24/09	351	18:52	23/10	184	07:44	22/11	188	08:01
26/08	341	18:12	25/09	345	18:29	23/10	336	17:51	22/11	340	18:09
27/08	183	07:42	26/09	187	07:59	24/10	330	17:28	23/11	183	07:38
27/08	335	17:49	26/09	339	18:06	24/10	355	19:10	23/11	335	17:45
28/08	354	19:07	27/09	182	07:36	25/10	350	18:46	24/11	354	19:04
29/08	349	18:44	27/09	334	17:43	26/10	344	18:23	25/11	348	18:41

All morning passes are southbound, evening passes are northbound.
Frequency 137.50MHz. INCRement is degrees change per orbit.

DAA '11'

ERIOD 102.0708999007642 MINS, INCR 25.51667384122266 DEGREES

/08	186	02:32	30/08	182	02:19	30/09	351	13:38	30/10	345	13:14
/08	339	12:44	30/08	335	12:31	1/10	348	13:27	31/10	189	02:51
/08	183	02:21	31/08	332	12:20	2/10	346	13:16	31/10	342	13:03
/08	336	12:33	1/09	355	13:51	3/10	190	02:53	1/11	186	02:40
/08	333	12:22	2/09	352	13:40	3/10	343	13:05	1/11	339	12:52
/08	330	12:11	3/09	349	13:29	4/10	187	02:42	2/11	183	02:29
/08	353	13:42	4/09	347	13:18	4/10	340	12:54	2/11	336	12:41
/08	350	13:31	5/09	344	13:07	5/10	184	02:31	3/11	181	02:18
/08	348	13:20	6/09	188	02:44	5/10	337	12:43	3/11	334	12:30
/08	345	13:09	6/09	341	12:56	6/10	182	02:20	4/11	331	12:19
/08	189	02:46	7/09	185	02:33	6/10	335	12:32	5/11	354	13:50
/08	342	12:58	7/09	338	12:45	7/10	332	12:21	6/11	351	13:39
/08	186	02:35	8/09	182	02:22	8/10	355	13:52	7/11	348	13:28
/08	339	12:47	8/09	336	12:34	9/10	352	13:41	8/11	345	13:17
/08	183	02:24	9/09	333	12:23	10/10	349	13:30	9/11	190	02:54
/08	336	12:36	10/09	330	12:12	11/10	346	13:19	9/11	343	13:06
/08	181	02:13	11/09	353	13:43	12/10	190	02:56	10/11	187	02:43
/08	334	12:25	12/09	350	13:32	12/10	344	13:08	10/11	340	12:55
/08	331	12:14	13/09	347	13:21	13/10	188	02:45	11/11	184	02:32
/08	354	13:45	14/09	344	13:10	13/10	341	12:57	11/11	337	12:44
/08	351	13:34	15/09	189	02:47	14/10	185	02:34	12/11	181	02:21
/08	348	13:23	15/09	342	12:59	14/10	338	12:46	12/11	334	12:33
/08	345	13:12	16/09	186	02:36	15/10	182	02:23	13/11	332	12:22
/08	190	02:49	16/09	339	12:48	15/10	335	12:35	14/11	354	13:53
/08	343	13:01	17/09	183	02:25	16/10	332	12:24	15/11	352	13:42
/08	187	02:38	17/09	336	12:37	17/10	330	12:13	16/11	349	13:31
/08	340	12:50	18/09	333	12:26	17/10	355	13:55	17/11	346	13:20
/08	184	02:27	19/09	331	12:15	18/10	352	13:44	18/11	190	02:57
/08	337	12:39	20/09	353	13:46	19/10	350	13:33	18/11	343	13:09
/08	181	02:16	21/09	351	13:35	20/10	347	13:22	19/11	187	02:46
/08	334	12:28	22/09	348	13:24	21/10	344	13:11	19/11	340	12:58
/08	332	12:17	23/09	345	13:13	22/10	188	02:48	20/11	185	02:35
/08	354	13:48	24/09	189	02:50	22/10	341	13:00	20/11	338	12:47
/08	352	13:37	24/09	342	13:02	23/10	186	02:37	21/11	182	02:24
/08	349	13:26	25/09	186	02:39	23/10	339	12:49	21/11	335	12:36
/08	346	13:15	25/09	340	12:51	24/10	183	02:26	22/11	332	12:25
/08	190	02:52	26/09	184	02:28	24/10	336	12:38	23/11	355	13:56
/08	343	13:04	26/09	337	12:40	25/10	333	12:27	24/11	352	13:45
/08	187	02:41	27/09	181	02:17	26/10	330	12:16	25/11	349	13:34
/08	340	12:53	27/09	334	12:29	27/10	353	13:47	26/11	347	13:23
/08	185	02:30	28/09	331	12:18	28/10	350	13:36	27/11	344	13:12
/08	338	12:42	29/09	354	13:49	29/10	348	13:25	28/11	188	02:49

11 morning passes are southbound, afternoon passes are northbound.
requency 137.62MHz. INCRement is degrees change per orbit.

METEOSAT DISSEMINATION SCHEDULE: S9008M01 CHANNEL A1 - 1691 MHz

GMT	HH	00			03				06				09			
MM	CH	A1	CH	A2	CH	A1	CH	A2	CH	A1	CH	A2	CH	A1	CH	A
2	D1	48	AI	48	D1	6	AI	6	C02	12	AIVH	12	C02	18	AIVH	1
6	D3	48	..	..	D3	6	..	..	C03	12	..	..	C03	18	..	.
10	D4	48			D4	6			D1	12	..	..	D1	18	..	.
14	D5	48	DTOT	48	D5	6	DTOT	6	D3	12	DTOT	12	D3	18	DTOT	1
18	D6	48	ETOT	48	D6	6	ETOT	6	D4	12	ETOT	12	D4	18	CTOT	1
22	D7	48			D7	6			D5	12	WEFA	2	D5	18	ATEST	
26	D8	48			D8	6			D6	12	..	..	D6	18	..	.
30	D2	1	BIW	1	D2	7	BIW	7	D2	13	BIV	13	D2	19	BIV	1
34	D9	1	AI	1	D9	7	AI	7	C02	13	AIVH	13	C02	19	AIVH	1
38	D1	1	..	..	D1	7	..	..	C03	13	..	..	C03	19	..	.
42	D3	1	LY	1	D3	7	LY	7	C3D	13	..	..	C8D	19	..	.
46			LR	1			LR	7	C2D	13	LY	13	C9D	19	LY	1
50									D3	13	LR	13	C2D	19	LR	1
54									D1	13			D1	19		
58	D2	2	BIW	2	D2	8	BIW	8	D2	14	BIVW	14	D2	20	BIVW	2

GMT	HH	01			04				07				10			
MM	CH	A1	CH	A2	CH	A1	CH	A2	CH	A1	CH	A2	CH	A1	CH	A
2	D1	2	AI	2	D1	8	AI	8	C02	14	AIVH	14	C02	20	AIVH	2
6	D3	2	..	..	D3	8	..	..	C03	14	..	..	C03	20	..	.
10					E1	8			D7	14	..	..	D7	20	..	.
14			LXI	1	E2	8	LXI	7	D8	14	LXI	13	D8	20	LXI	1
18			AW	2	E3	8	AW	8	D9	14	AW	14	D9	20	AW	2
22			..	..	E4	8	..	..	D3	14	..	..	D3	20	..	.
26					E5	8										
30	D2	3	BIW	3	D2	9	BIW	9	D2	15	BIV	15	D2	21	BIV	2
34	D1	3	AI	3	D1	9	AI	9	C02	15	AIVH	15	C02	21	AIVH	2
38	D3	3	..	..	D3	9	..	..	C03	15	..	..	C03	21	..	.
42					E6	9			D1	15	..	..	D1	21	..	.
46					E7	9			D3	15			D3	21		
50			WEFA	1	E8	9							C1D	21		
54			..	..	E9	9			C2D	15			C2D	21		
58	D2	4	BIW	4	D2	10	BIW	10	D2	16	BIVW	16	D2	22	BIVW	2

GMT	HH	02			05				08				11			
MM	CH	A1	CH	A2	CH	A1	CH	A2	CH	A1	CH	A2	CH	A1	CH	A
2	D1	4	AI	4	D1	10	AI	10	C02	16	AIVH	16	C02	22	AIVH	2
6	D3	4	..	..	D3	10	..	..	C03	16	..	..	C03	22	..	.
10			AW	4			AW	10	C3D	16	..	..	C3D	22	..	.
14			..	..			..	..					C4D	22		
18	TEST	0	ADMIN	0	ADMIN	0	TEST	0	TEST	0	ADMIN	0	ADMIN	0	TEST	
22																
26																
30	D2	5	BIW	5	D2	11	BIW	11	D2	17	BIV	17	D2	23	BIV	2
34	D1	5	AI	5	D1	11	AI	11	C02	17	AIVH	17	C02	23	AV	2
38	D3	5	..	..	D3	11	..	..	C03	17	..	..	C03	23	..	.
42					E1	11			C5D	17	..	..	E1	23	..	.
46					E2	11			C6D	17	WEFA	3	E2	23	..	.
50					E3	11			C7D	17	..	..	E3	23	..	.
54	CTH	0							CTH	0					..	.
58	D2	6	BIW	6	D2	12	BIVW	12	D2	18	BIVW	18	D2	24	BIVW	2

SOME VISIBLE IMAGE FORMATS ARE SUBJECT TO

spreadsheet and rapidly discover two things:

1). That there are 1440 minutes in a day - useful thing to know, that.

2). I had forgotten more than 90% of the trigonometry that had been drummed into my skull whilst at school. Osmosis is a wonderful, but two way process.

Days later and with many (this is fun, remember) theories invented and refuted by minor facts like the "silly bleepings" not appearing at my "predicted" times or, worse, appearing when I did not predict them, I begin to glimpse the real truth. The Meteors cheat, they go backwards. They are also sometimes switched off when they go over my house. My son, now with short hair, bursts out laughing whenever I "predict" anything, no matter what it may be.

By now, it is mid January. My spreadsheet works for non-cheating satellites i.e. NOAA on both northbound and south bound passes. It uses impressive amounts of memory and can predict overflights as much as 15 days in advance (gosh!). Office/workshop now nearly knee deep in paper.

I discover RIG and AMSAT-UK. I join both. I pester Ron at AMSAT, Des and Dermot with letters and later with phone calls for help. Thanks, gents. AMSAT-UK (no, this not one of their paid ads) offer a brilliant program for the PC/AT user. It is called SATSCAN-II. I buy it.

It is a lot better than my spreadsheet model. It is also better than the Pascal code that was supposed to be the successor to the spreadsheet. I resolve to give up programming.

There are now regular and predictable bleepings from the receiver and less regular ones from the neighbours who at first felt that the appearance of a crossed dipole was to the detriment of our neighbourhood. It is amazing what people will get used to over time but, "Where's the pictures like they have on TV, Dad?", a good question, son, because there aren't any - yet.

It is now the end of March, 1990, I have ordered a box to provide pictures, both stills and animation, on-screen, storage to disk, other wonders and, even printing but, since it hasn't arrived and I don't know how to use it anyway, I'll leave those distractions for the next issue.

THE RUSSIAN SATELLITE SCENE
by Les Currington, G8LOK

This is one of the most difficult reports I have had the pleasure of writing, no sooner do we find an operating schedule than the satellite either stops operating or changes frequency. May be we are seeing the results of Glasnost and the rescheduling of resources to domestic use.

During the beginning of April we saw a sudden change of frequency on Meteor 3-02 and Meteor 2-16 at the same time three of the most recent launches were switched off.
Meteor 3-02 commenced transmitting on 137.3 MHz and Meteor 2-16 changed to 137.85 MHz, Meteors 3-03 2-17 and 2-18 were switched off or went stand by ?; It is possible with the scanners switched off that the useful life of the satellite could be extended for use at a later date.

I had just written the above when to my surprise I had a phone call from Geoff indicating that a new Meteor, 2-19 was launched so that leaves me more puzzled than ever. Several orbits have been seen and so far excellent pictures have been received, including a perfect pass from Bear Island to Egypt.

Because of the lack of signals from a Meteor on VHF I think it would be unwise to think that the satellite has stopped operating. If you have read the article by Geoff in RIG 20 you would have noticed that the Meteors operate on more than one frequency, so it is possible that the digital transmissions are still operating.

Reports as at 3/July/90

Okean 2 **137.4 MHz.**

During the test runs in March it was soon obvious that Okean was not operating correctly as the Radar images were showing very uneven illuminations of the Radar scan. The Radar images appeared to be showing the sub satellite point which is not the best position for a Synthetic Aperture Radar picture. The microwave scanner was also showing signs of faulty operation. However several of our members have reported excellent visible pictures recently. On the 28/6/90 during a pass from Italy to Norway all land features were transmitted at a peak white. I hope this was a once off occurrence, as when operating correctly the contrast can be superb.

Meteor 2-16 **137.85 MHz**

This old veteran has been giving good pictures over the last few months and is now in a early morning south bound orbit.

Meteor 2-17 **137.3 MHz**

No signals reported from this bird for several months ?

Meteor 2-18 **137.3 MHz**

Nothing to report; no doubt it will appear again when we least expect it.

Meteor 2-19 **137.85 MHz**

Excellent visible pictures have been received, see above.

Meteor 3-02 **137.3 MHz**

Nothing to report for several weeks after several weeks of continuous operating.

Meteor 3-03 **137.3 MHz**

Now operating in a late afternoon north bound pass, intermittent IR pictures reported by several members.

Having had a very good holiday but unfortunately catching the flu on my return, hence three weeks out of touch, I am most grateful to Malcolm Purvis and James Brown for phoning me and bringing me up to date with events, also of course Geoff Perry for confirming launches and the latest satellite news.

KEPLER ELEMENTS
provided by Max White - Kettering Group

	NOAA 9	MET 2-17	MET 3-03
	137.62 MHz	137.30 MHz	137.85 MHz
	84-123 A	88-05 A	89-86 A
EPOCH OF DATA	90193.26836137	90192.91527670	90192.54974308
ACCELERATION	0.00000432	0.00000097	0.00000061
REV NO	28752	12360	3415
INCLINATION	99.1684	82.5453	82.5499
R. A. NODE	193.6802	330.7997	200.8081
ECCENTRICITY	0.0014361	0.0015241	0.0014455
ARG OF PERIGEE	300.7705	254.5921	269.0409
MEAN ANOMALY	59.2051	105.3555	90.9026
MEAN MOTION	14.12616769	13.84351699	13.15860317

	MET 3-02	NOAA 11	NOAA 10
	137.3 MHz	137.62 MHz	137.50 MHz
	88-64 A	88-89 A	86-73 A
EPOCH OF DATA	90192.57869552	90193.32918854	90193.29612781
ACCELERATION	0.00000391	0.00000328	0.00000459
REV NO	9416	9251	19818
INCLINATION	82.5405	98.9837	98.5976
R. A. NODE	260.1706	141.6667	220.6777
ECCENTRICITY	0.0015560	0.0011681	0.0013064
ARG OF PERIGEE	250.7632	209.1738	192.8958
MEAN ANOMALY	109.1793	150.8778	167.1887
MEAN MOTION	13.16900235	14.11647077	14.23661383

	MET 2-18	MET 2-16	OKEAN 2
	137.3 MHz	137.85 MHz	137.4 MHz
	89-18	87-68 A	90-18 A
EPOCH OF DATA	90192.53192138	90192.62411816	90192.85122897
ACCELERATION	0.00000042	0.00000219	0.00001516
REV NO	6893	14636	1970
INCLINATION	82.5190	82.5537	82.5265
R. A. NODE	209.0593	270.9204	75.0155
ECCENTRICITY	0.0012652	0.0011321	0.0019087
ARG OF PERIGEE	299.9972	179.1000	189.8750
MEAN ANOMALY	59.9935	181.0182	170.2019
MEAN MOTION	13.83987167	13.83661049	14.73258722

MET 2-19, 137.85 MHz, 90-57A

EPOCH OF DATA	90190.71054433
ACCELERATION	0.00000169
REV NO	163
INCLINATION	82.5475
R. A. NODE	270.7909
ECCENTRICITY	0.0015085
ARG OF PERIGEE	220.3947
MEAN ANOMALY	139.6098
MEAN MOTION	13.83838708

Reference Orbits for Russian Satellites supplied by Dick Boardman

These are the times of north going equator crossing (in GMT) and longitudes (in degrees west) for three Russian satellites.
They are given at weekly intervals together with the period and the change in longitude per orbit.

MET 2-16
period 104.13 minutes increment 26.24 degrees

01 JUL 01:36 023	08 JUL 00:12 014	14 JUL 22:49 006
21 JUL 21:25 357	28 JUL 21:46 015	04 AUG 20:23 006
11 AUG 18:59 358	18 AUG 19:20 016	25 AUG 17:57 007
01 SEP 16:33 358	08 SEP 16:53 016	15 SEP 15:30 008
22 SEP 14:07 359	29 SEP 14:28 017	06 OCT 13:04 008
13 OCT 11:41 000	20 OCT 12:01 017	27 OCT 10:38 009

OKEAN 2 137.85 MHz
period 97.76 minutes increment 24.57 degrees

01 JUL 11:02 359	08 JUL 10:56 011	15 JUL 09:12 359
22 JUL 09:06 011	29 JUL 07:23 358	05 AUG 07:17 010
12 AUG 05:34 357	19 AUG 05:27 009	26 AUG 03:43 356
02 SEP 03:38 008	09 SEP 01:54 355	16 SEP 01:47 007
23 SEP 01:42 019	29 SEP 23:58 006	06 OCT 23:53 018
13 OCT 22:08 005	20 OCT 22:02 017	27 OCT 20:19 004

MET 3-03 137.85 MHz
Period 110.01 minutes increment 27.49 degrees

01 JUL 19:37 005	08 JUL 19:30 015	15 JUL 17:34 358
22 JUL 17:27 008	29 JUL 17:20 018	05 AUG 15:24 001
12 AUG 15:18 011	19 AUG 15:10 021	26 AUG 13:14 004
02 SEP 13:08 014	09 SEP 11:11 357	16 SEP 11:04 007
23 SEP 10:58 017	30 SEP 09:01 000	07 OCT 08:54 010
14 OCT 08:48 020	21 OCT 06:52 003	28 OCT 06:45 013

News from Italy and the Images
Marciano Righini, I4MY

I received the kit for the 1700-MHz Low Noise Amplifier. It worked immediately with no problems of instability or else. The gain is certainly very high (I have no means of measuring it), but, alas, it is still insufficient for the NOAA's. With a 1.4 meter dish the sync detector can recognise the start sequence of some of the lines, but not all of them. The intermediate frequency (10.7 MHz in our case) bandwidth is a critical factor too: with a relatively narrow bandwidth there is no recognition; if the bandwidth is large, too much noise comes in. I am afraid I will have to install a larger dish. I should be glad to know the results of other amateurs.

In the meanwhile Guido Emailiani.I4GU, Claudio Pagnani and myself built a scan converter based on an IBM PC clone. We digitised the analog signal, fed it into two buffer memories which, alternatively, send it to the PC in bursts so that it has the time to store the data on hard disk. Once stored, the data can be processed and displayed on the monitor. More over it can be sent to the buffer memories again and subsequently to the DAC which converts it into an analog stream to drive a Fax machine.

The system was designed to handle the HRPT which is not available yet. At the moment we use it for APT, WEEFAX and LF and HF band video signals.
You can see the results from the pictures enclosed (see centrefold).

All the images were digitally processed to enhance contrast, then printed using a Muirhead Jarvis Picture receiver type D-365-B. Processing implied shifting the white level to the middle of the grey scale and gradually darkening both extremes. The pictures are a little elongated because the index of cooperation of our fax machine is 528, whereas that of the NOAA's is 576.

Picture 1- NOAA-11, 23 April 1990, 1051-1105GMT, VIS From right to left: the Volga flowing into the Caspian sea, the rivers of Mesopotamia and the eastern Mediterranean.

Picture 2-NOAA-11, 28 February 1990, 1209-1225 GMT, VIS. The image displays the central portion of the swath from Sinai to the cloud capped Alps.

Minutes of the Annual General Meeting of the Remote Imaging Group

Held on 12th May 1990 at the RSGB VHF Convention at Sandown Park racecourse.

The meeting was opened at 1515 by the chairman, Henry Neale. 31 members of the group were present.

Apologies for absence
Apologies had been received from Dermot Dobson, Stan Ames and from Bob Leggett.

Minutes of the last meeting
The minutes of the last meeting were accepted as a correct record.

Chairman's report
The chairman reported that the group had another successful year. He had agreed to attend two additional rallies this year (Harrogate and Longleat) and appealed for volunteers to help on the stands. The chairman also reported on the LNA kits sold by RIG. These had caused a considerable transitory drain on RIG funds - at the time of preparing the annual accounts, the kit components had been purchased but no income had yet been generated because the kits had not been dispatched.

The posting of newsletter 20 had been later than planned, partly due to delays at the printer. The chairman also commented that the project to produce a handbook of 'useful' articles from newsletters 1 to 7 was still pending.

Secretary's report
The secretary introduced the topic of the newsletter and its content and mentioned that contributions are always welcome. He asked the members present to suggest future directions for newsletter articles.

Brian Measures stressed the importance of articles for beginners and suggested that a handbook for newcomers should be produced. Articles on image interpretation and meteorology were also suggested by several members. Tony Jay proposed that the newsletter be more sectionalised. The secretary said that regular 'columns' were in existence and would be encouraged. An interest in articles on image processing was expressed and also continuing articles on the YU3UMV framestore was seen as being important.

The general feeling of the meeting was that the level of advertising in the newsletter was about right.

The secretary reported that he still had a large number of letters to answer but the backlog of correspondence is slowly decreasing. He also said with some embarrassment that the 'second generation' YU3UMV framestore boards were still not yet available. Hopefully they should be produced in the next three months.

Membership secretary's report
The membership secretary reported that the membership stood at approximately 830 and he gave a summary of the results of the membership questionnaire.

Treasurer's report
For those of you who dislike columns of figures, here is a simple guide.
I am delighted to say that we have had another successful year, our subscriptions are keeping inline with the Newsletter production and postage costs, but we are advised that printing costs (approx 1/3rd increase) and postage price rises are due.
As you will have read we have equipped the office with :- a laser printer and extra memory, vga monitor and card for desktop publishing. These are being used to improve the quality of the Newsletter. This obviously reflects in the figures at the end of the year.
In round figures, costs attributable to the Newsletter, amount to £5,805, and income from subscriptions, back issues, adverts, commission and donations is £6,679 Income from equipment sales, £4,525

Expenditure on equipment for resale, £7,002, (Dishes, feeds receivers etc.), and for the office £2,385, this results in a figure of £6,415 to account for our increase in stock of £2,975

The high stock figure also reflects the cost of components purchased for the 50 LNA kits we are selling, the components were purchased at the end of our year, and this accounts for around £1,300 of the stock figure, the income from these will be in this year.

This basically results in using some of our surplus from previous years, approx £1,015 and will leave us with a surplus of around £7,300 to carry forward as against last years amount of £8,328

All in all RIG is in a healthy position, and my thanks go to all the members, non-members, advertisers, and anyone else who has supported us through out the year.

Nominations for the 1990 committee

It was noted that Dermot Dobson and Stan Ames wished to stand down from the committee. The proposal that the current committee (less the above two) be re-elected was passed, nem con (proposed by Peter ball and seconded by James Brown). John Tellick and Ray Godden were elected to fill the vacant places on the committee.

Any other business

Several members expressed an interest in hardware and software packages for the IBM PC for the display and manipulation of satellite images. In particular, it was suggested that if funds permitted, RIG should purchase one or more of these packages for demonstration at rallies etc. The chairman replied by suggesting that reviews of such packages would be appropriate for inclusion in the newsletter. The difficulty of obtaining unbiased reviewers was noted.

The issue of the use of weather satellites in education was raised by Mike Meadows and was briefly discussed. The importance of cooperation and coordination was noted, especially since many teachers seemed to be intimidated by the technology required.

A member asked about the availability of information on radio fax and other sources of meteorological data. The Meteorological Broadcasts News-Sheet was mentioned as a useful source of information.

Another question concerned the images transmitted by OSCAR satellites. It was stressed that OSCAR satellites do not transmit images in APT formats. Further information is of course available via AMSAT, but an article on the subject should appear in the newsletter.

The meeting closed at 1611.

PCSAT II - Initial Specifications
by Phil Seaford (RIG Sec.)

PCSAT II is the latest development to emerge from Timestep Ltd, it represents a low cost entry into the field of remote imaging on a IBM PC or compatible. At the outset it should be understood that a VGA display is required to display the images received at best, however CGA/EGA versions of the software are supplied.

The system as supplied comprises:
Plug-in half length 8 bit card for the PC
Connecting lead
Operating manual
Operating software comprising:

TEST	program to set interface levels
METEOR	program for Meteor satellite reception
OKEAN	program for Okean reception/display
NOAA	program for NOAA reception, using VGA
INVERT	for image file inversion
VGASAT	program for geostationery satellite images on VGA displays
PCSAT	program for geostationery displays using CGA/VGA
HPDUMP	program for printing on HP Laserjet II printers
PCANIMAT	program for pre-programmed reception of Meteosat images and their subsequent sequential display

Many of you will know that I am a great exponent of the YU3UMV framestore, things haven't changed. If you do not have a PC with a VGA display then this is still the most cost effective high resolution display around. However, I am lucky to have the 'RIG' Multisync 3D VGA display at home and as mentioned earlier the results using the NOAA program above are truly excellent. The same goes for the METEOR program.

Images are received via the input filters and A-D converter directly into memory. A full image will consume 512 KBytes of memory. Further memory is required for the program, but as yet there is no requirement for extended/expanded memory. My resident disk parking utility which parks the disk after 4 minutes of no activity caused the image being received to slip sideways about 1". Removing the utility cured the problem.

continued on page 60

REMOTE IMAGING GROUP
- INCOME & EXPENDITURE
- 1ST JANUARY 1990 - 31ST DECEMBER 1990

EXPENDITURE			INCOME		
A/D	16.36		FEED	0.00	
PRE-AMP	637.64		MOUNT IN DISH SALES	0.00	
DISH	2474.51		RECEIVER	329.27	
FEED	763.00		DOWNCONVERTER	939.79	
MOUNT	0.00		A/D	228.60	
RECEIVER	543.96		PRE-AMP	107.36	
MISC & SAT MODULES	1455.70		MISC & SAT MODULES	627.36	
DOWNCONVERTER	1111.34		DISH	2293.60	
OFFICE EQUIP	2385.00				
		9387.51			4525.98
LESS INCR IN STOCK 2972.01					
		6415.50			
NEWSLETTER PRINTING	3254.20		SUBSCRIPTIONS	5315.86	
NEWSLETTER POST	1355.00		BACK ISSUES	38.50	
GENERAL POSTAGE	310.33		ADVERTS	630.00	
SECRETARIAL SERV	239.64		COMMISSION RECEIVED	684.58	
RALLY EXP	446.12		DONATIONS	11.00	
COMMITTEE EXPENSES	10.00		OSCAR LOC	0.00	
BANK CHARGES	5.19				
OFFICE EXPENSES	185.00				
		5805.48			6679.94
TOTAL		12220.98			11205.92
SURPLUS OF INCOME OVER EXPENDITURE		(1015.06)			
		11205.92			1205.92

RIG BALANCE SHEET

AS AT 31st DECEMBER 1989

EMPLOYMENT OF FUNDS		FUNDS EMPLOYED	
STOCK - NEWSLETTERS	700.00	SURPLUS B/F	8328.37
STOCK - EQUIPMENT	6476.00	SURPLUS FOR PERIOD	(1015.06)
CASH AT BANK	134.72		
CASH IN HAND	2.59		
	7313.31		
NET ASSETS	£7,313.31	SURPLUS C/FORWARD	£7,313.31

WANTED - TREASURER

As a result of the recent resignation of our treasurer Bob Leggett due to business commitments, RIG is looking for a suitable person to fill the post. Ideally the individual will be within travelling range of our regular committee meeting venue at Leighton Buzzard. The post is voluntary and an ideal candidate would have some accountancy skills.

Enquiries to Henry Neale, 0945 85353

1990 Membership Survey - Des Watson

It is time to report on the analysis of the questionnaire on the 1990 membership renewal and application forms. At the time of writing (May 1990), membership renewals are still coming in daily, but not at the January or February rate, and so useful information can be presented now.

The last survey I carried out was in September 1988 and in the data shown below, the 1988 figures are shown in parentheses.

Of the 831 (1036) members:

14% (13%)	are employed in education,
9%	of RIG members live outside the UK,
64% (52%)	are receiving signals from polar orbiters,
33% (19%)	are receiving signals from Meteosat (or GOES etc.),
2%	are receiving HRPT signals or are PDUS for Meteosat,
40% (25%)	of those receiving satellite signals are experiencing some form of interference.

There has clearly been a large increase in the proportion of the membership receiving Meteosat - this must at least in part be due to the widening of the availability of high quality Meteosat receiving hardware.

The sharp increase in the proportion of members experiencing interference demands investigation. Judging by the comments appended to the questionnaires, the problem of interference does not seem to be quite as severe as the figure of 40% may suggest. A large number of these positive responses are from very mild cases of interference and it seems probable that an increased awareness of the problem (from, for example, articles in the RIG newsletter) leads to an increased number of reports of interference. Furthermore, many stated in the questionnaire that their interference problems had improved after making receiver modifications but they were still experiencing mild interference. Nevertheless, the problem is still there and affects some people very badly indeed. In some cases, it makes the use of the VHF satellite band impossible.

There are some interesting trends in the use of display equipment. Of those specifying display equipment:

50% (63%)	use the YU3UMV framestore,
57% (59%)	use a microcomputer,
9% (18%)	use 'normal' fax,
2% (2%)	use photographic fax, and
9% (9%)	use other types of framestore.

The sum is greater than 100% since some members use more than one display device.

The changes in popularity of microcomputers are reflected in the data below:

28% (36%)	use a BBC machine,
19% (7%)	use an IBM PC, XT, AT, PS/2 or clone,
6%	use an Archimedes,
5%	use an Amiga,
5% (3%)	use an Atari,
3% (7%)	use a Spectrum, and
10% (10%)	use other machines.

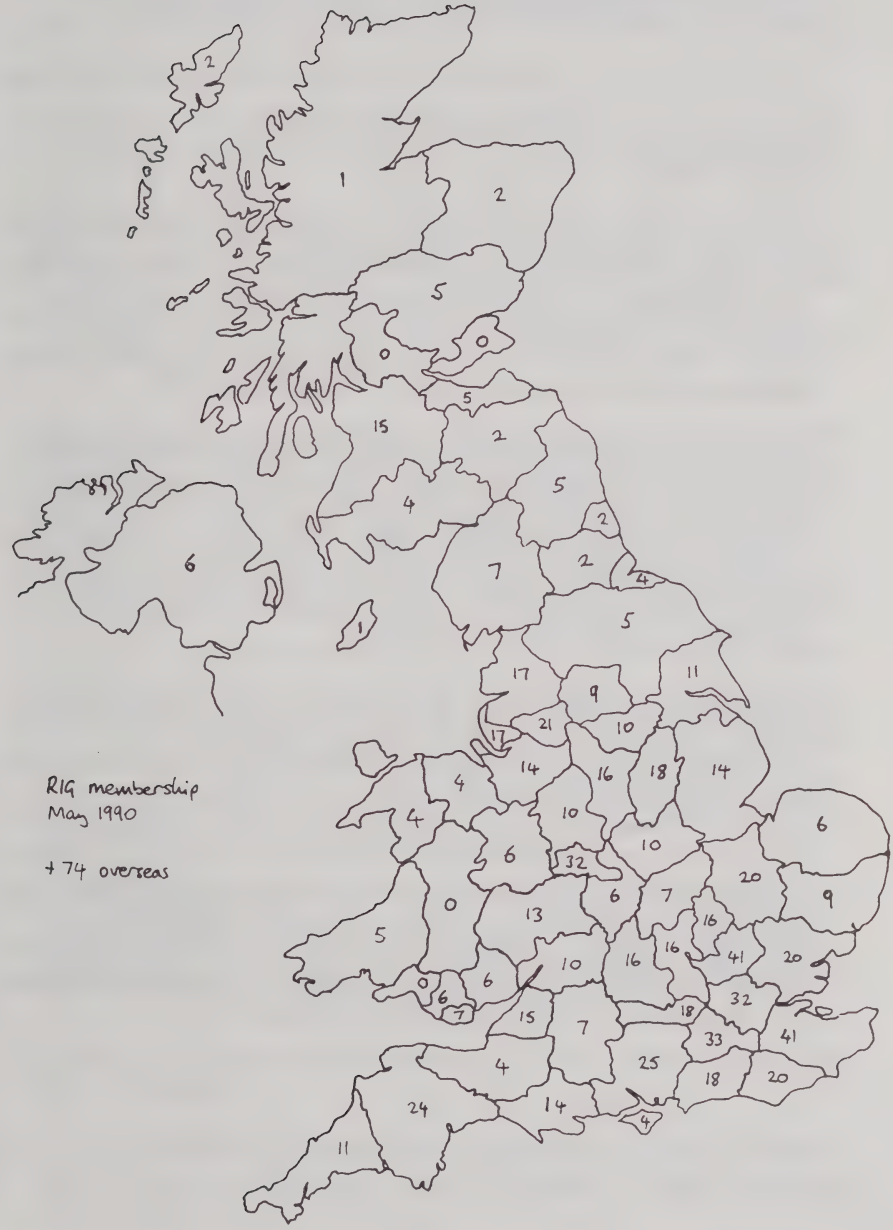
Of those specifying an antenna for Meteosat reception:

85%	use a dish,
18%	use a yagi, and
1%	use another antenna.

Of those specifying a downconverter:

46%	use Dartcom,
14%	use Microwave Modules,
10%	use LMW,
9%	use Timestep,
7%	use a home-built downconverter,
4%	use Maplin, and
10%	use other types.

The adjoining map shows how RIG members are distributed through the UK.


RIG membership
May 1990
+ 74 overseas

Finally, the question asking whether the group should attend the RSGB rally at the NEC produced an interesting result. As renewal forms were coming in, I kept a running count and after I had received about 300 renewals, there was a very strong feeling that RIG should not attend. The current tally is 271 in favour and 262 against!

A note from the Membership Secretary - Des Watson

I'd like to thank all of you for your membership renewals and for taking the trouble to fill in the questionnaires on the forms. I was also very interested to read all the supplementary comments and information I received and I'm sorry that my correspondence was delayed during the first few months of the year. Fortunately, the pile of letters to be answered has at last almost disappeared!

There are a couple issues which were raised by several members which I'd like to comment on here. Some members queried the fact that they didn't seem to have membership numbers. In fact, the way in which I manage the membership database has no need for membership numbers, and this explains why they have never been issued. Having membership numbers would mean more work for me and another number for us all to forget!

Another query raised concerned the publication of a list of members. I don't intend to do this. The danger of publication is that it would make the list of members publicly available and hence potentially open to abuse, being used for targets for unsolicited mail, services and so on. However, one of the aims of the Remote Imaging Group is to encourage cooperation between members and so I'm always happy to supply members with selective lists of, for example, local members or members using a particular computer system. Obviously, I respect the wishes of those who do not wish their names and addresses to be used for such purposes. If you would like such lists, let me know. A SAE would be appreciated!

MAPLIN RECEIVER MODS
by Peter Davies

I entered this hobby in 1989 by buying a Maplin receiver and aerial. I got it working quickly and although it did receive satellites, it also got hammered by pagers. I was recommended to put more scan filters in the system, but this did not work. After doing a bit of reading up on filters, it became clear that in a 3 filter system, the first two filters should be wide, good quality, and with a good stop band rejection. It's ok saying that the scan filter is 50KHz wide, what's it doing 1/2 MHz away? In actual fact it's letting a lot through, so, I acquired 2x10.7 MHz ceramic filters at 3.00 pounds each, they are like large blocks. I fitted these in place of the existing ones and left the final filter as a scan filter to determine the 50 KHz final band width.
The pagers now dropped considerably. I then acquired a new aerial, crossed dipole and reflectors.

This is important as in a way, it gives selectivity. The aerial now looks more up than horizontal, thereby cutting down on pager interference and improving on satellites. I then tried bleeding the If (post scan filter) into my R1000 short wave receiver, no pagers at all, horizon passes, noise free. A check with a grid dip oscillator near the demodulator chip, showed that this chip is very responsive to signals far out either way from 10.7 MHz. This chip has virtually no 'selectivity' at all. I then looked at the Cirkit RX and ended up buying the 6601 chip and 11 MHz Xtal from Cirkit and built a new demodulator board. It's easy to do, costs about five or six pounds and connects in quite easily via some linking capacitors, ie in and out. The board just sits above the existing chip. The results are a ten fold increase in selectivity (due to down conversion), and now I do not get pagers, only four nice clean pictures.

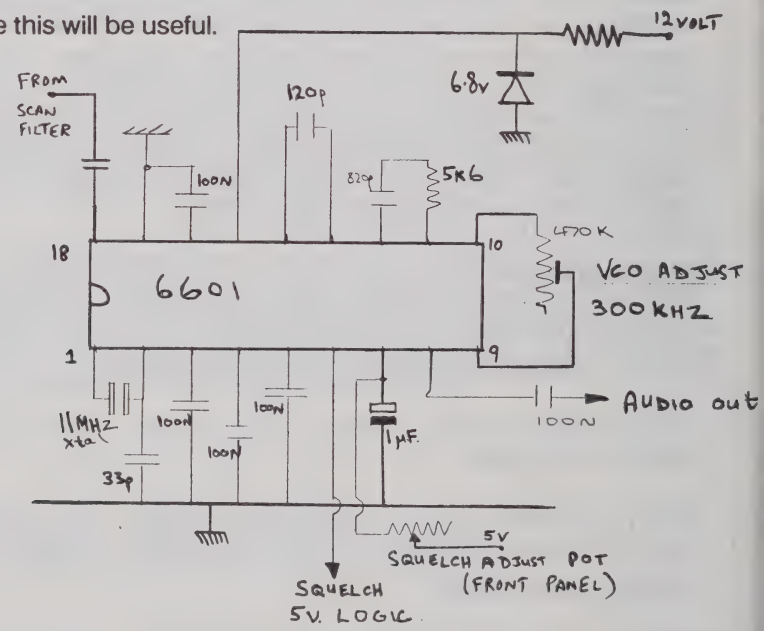
The next problem, can I make it scan? This is vital in my opinion. It's like airband radio or amateur radio, stay tuned to one frequency and use your prediction tables and a Met sat is just going overhead on the next channel! By scanning, you get all the action.

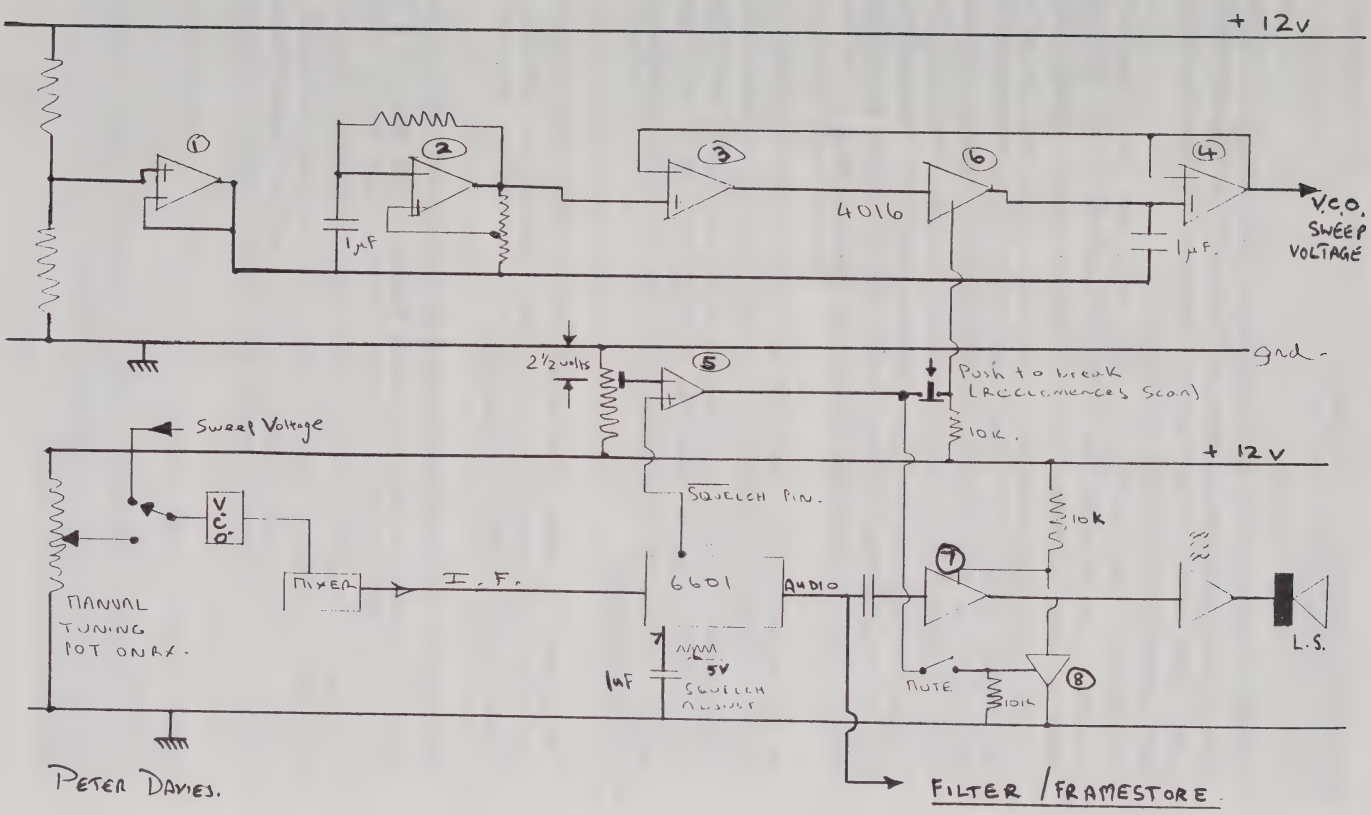
So, the circuit I have evolved is shown, it's not perfect but it does work, so here goes.

IC (1) is a buffer to split and stabilise the supply. It's handy to spilt at about 1/3 of the rail voltage to give the sweep voltage maximum room to move around.

IC (2) is a sweep oscillator. Adjusting the resistor valves alters the sweep rate, and magnitude, I aimed for about 4.5 volts sweep (to match the manual tuning pot), with about two sweeps/second. You will need a scope to set this up.
The sweep voltage is coupled to a sample and hold circuit, IC (3) and (4).
IC (6) is an electronic switch with a control line switching between ground and 12 volts. When the switch is on, the sample circuit sends the "sweep" to the V.C.O. via a sweep/manual switch. When the control line goes down, the circuit "holds" the last voltage sampled, i.e. the charge on the input capacitor, which is buffered to output. The voltage and hence frequency of the V.C.O. is rock steady. Control is from the 6601 chip squelch output. IC (5) converts the 5 volt logic control signal to a 12 volt one by a simple comparison to the 2 1/2 volts on the inverting input.
IC (7) and IC (8) mute the audio output on no signal, (very useful), with a switch to disable this if doing some fine manual tuning. Sometimes, the circuit does not always 'lock on' to the frequency, it's on the edge, the push switch on IC (5) output makes it scan again for another try! The scanning is stopped, for manual operation, by opening the squelch pot, this keeps the squelch line up and audio stages active. The oscillator coil may require a slight retuning to get the right frequency sweep from the achieved voltage sweep.

I hope this will be useful.




+ 12v
1
2
3
6
4
4016
1µF
1µF.
V.C.O. SWEEP VOLTAGE
gnd.
2½ volts
5
Push to break (Recommences Scan)
10K.
Sweep Voltage
+ 12v
SQUELCH PIN.
V.C.O.
MIXER
I.F.
6601
AUDIO
7
10K
L.S.
MANUAL TUNING POT ONRX.
1nF
5V
SQUELCH ADJUST
MUTE
8
10IK
PETER DAVIES.
FILTER / FRAMESTORE

Whats happening in Norway?
Bjorn Bjortorp.

The RIG receiver is great as is the Dartcom downconverter. On VHF I have crossed dipoles with reflectors (Martelec) and pre amp (RIG or Garex) giving AOS/LOS at 0 degrees elevation in all directions. Noise free pictures from 2 degrees and higher.
For Meteosat I use a 1.5 m TVRO dish, which, with the addition of the L-band cookie tin horn, has 5 LNBs. Needless to say this gives perfect pictures. However I spent a painful weekend twisting copper wire into small loops, 43 of them, that in the end became a quad loop yagi, Henry Neale style. I used a loop for the second reflector (just as good as the sheet reflector) and the RG 58 for the balun (!). Some " GOO - sealant Military for the use of - mil spec --" etc made the (frayed and ugly looking) balun weatherproof. And it came to pass that I connected the loop yagi to the downconverter whereupon I beheld a perfectly noiseless picture from Meteosat Bingo!

My framestore is a Wraase FX-666 with 512x512x6 bit resolution. The picture quality is stunning to say the least. I keep track of the satellites with the orbit 2 programme from Amsat (USA), and I get all the prediction bulletins I want free of charge from NASA once a week. Actually I get some of them every day, but this is not necessary for weather satellites.

The Wraase framestore can take FM fax as well as AM using a VLF converter I enjoy press photos from DPA (Germany) on 139 KHz, the receiver being a simple Sanqean 803.

The bilious colours from the Wraase were less than satisfactory so I made my own false colour generator based on a 8 level-3 bits flash converter. With multi turn pots at either end of the voltage comparator chain the colour chain can enhance any grey scale transition. A selector switch on the output can give just about any colour palette including the blue sea - green land - white clouds so beloved by the weather forecast it all cost just a few pounds in parts.

Okean 2 gives lovely pictures of the Bothnia sea, Sweden and Norway, it makes you think, though that this spy ahem, oceanographic satellite takes mainly pictures of this area. Could it be due to the fact that the Russians consider this their own private parking lot for submarines ?

The Swedes never officially complain, not even when a Russian sub ran aground near Stockholm and the Swedish military tug was necessary to get it off, it just didn't happen, in spite of the daily pictures in the papers and on TV but then Sweden is not officially a Marxist country either!

An Introduction to Image Processing
Des Watson

While I was at the RIG meeting at Sandown Park recently, several members suggested that they would be interested in reading about computer-based image processing. I've put together this short article giving a brief overview of some of the more important practical techniques and I would be very interested in receiving some sort of feedback indicating which topics should be covered in greater detail in possible future articles.

As far as this article is concerned, the starting point is an image stored in some form of computer memory. The image processing is to be carried out by a computer associated with this image memory. Thus, for example, the YU3UMV framestore on its own is not an appropriate system for image processing - the image has to be stored on a computer-based system for the processing to be carried out.

The image consists of a two-dimensional array of individual picture elements (pixels), each of which has a numerical value associated with it. This value indicates the intensity (grey level) of that particular pixel in a monochrome image and the intensity and colour in a colour image. For high resolution images, this array will be very large. For example, for good quality monochrome images, a resolution of at least 512x512 pixels is often used where each pixel is represented by a single 8-bit value (yielding a total of 256 different possible greyscale values for each pixel). Such an image requires 256kbytes of storage (although for long-term storage, it is possible to perform some form of compression).

Given such an image, it is possible to apply transformations to the values representing the individual pixels to achieve an improvement in the displayed image. The aim is to enhance the image so that it is more suited for a specific application.

For example, the techniques used to enhance the land detail in a satellite image are not going to be the same as those suitable for highlighting areas of cloud.

One of the simplest techniques for image enhancement is called contrast stretching. Suppose, for illustration, that the brightness of each pixel in a monochrome image is defined by a single byte - i.e. a number in the range 0 to 255. Suppose also that an image is acquired and it is found that there are no pixels with brightness value less than 100 or greater than 150. The image is therefore not making use of the full range of possible brightness values and hence will appear with poor contrast. A simple enhancement would be to scale each brightness value so that the value 100 is transformed to 0 and the value 150 is transformed to 255. The image now makes use of the full range of brightness values and therefore contrast is improved. In this particular example, a pixel brightness of x in the original image would be transformed into a brightness value of (x-100)*255/150 in the final image. This simple transformation can have a dramatic effect on the quality of the image. Obviously more complex scalings can be performed (for example, making use of a technique called histogram equalisation), and there is much scope for experiment.

Contrast stretching is a transformation which is applied independently to each pixel in the image. There are many useful image processing techniques in which a pixel's transformation depends not only on the brightness value of that pixel but also on the brightness values of that pixel's neighbours. A simple yet powerful approach for the implementation of this type of transformation involves selecting each pixel in the original image and examining that pixel's 8 neighbours - i.e. a 3x3 pixel square is selected. The transformed pixel value is obtained by applying a simple mathematical function on these 9 values. The type of image transformation depends on the nature of this function. The function, and hence the transformation, is specified by an array of 9 numbers, called a mask. The centre of this square mask is passed over the original image, pixel by pixel. For each pixel in the original image, we multiply each pixel value contained within the 3x3 mask area with the corresponding value stored in the mask, and the sum of these 9 multiplications obtained. This is the value which is stored in mask's central pixel position in the new image.

For example, a mask containing the values:

```
1/9 1/9 1/9
1/9 1/9 1/9
1/9 1/9 1/9
```

will perform an averaging operation where the transformed value of a pixel will be the average of its own value and that of its 8 neighbours. This transformation acts as a low-pass filter, where the high-frequency components in the original image (such as fine detail or spots of noise) are attenuated. In a weather satellite application, such a filter could be applied when cloud areas are to be highlighted. Since clouds are comparatively large objects (i.e. low frequency components) they will remain comparatively unchanged. It is possible to alter the mask whilst retaining the low-pass characteristics. For example:

```
0.1 0.1 0.1                 0.0625 0.0625 0.0625
0.1 0.2 0.1       or        0.0625 0.5    0.0625
0.1 0.1 0.1                 0.0625 0.0625 0.0625
```

also act as low-pass filters, but with slightly different characteristics.

A different mask can act as a high-pass filter. Here, the high-frequency components of the image are enhanced. For example, fine detail and edges are made to stand out. A typical mask for this transformation is:

```
-1 -1 -1
-1  9 -1
-1 -1 -1
```

This general type of filter can have a dramatic effect on the image,making detail almost invisible before stand out clearly. Again, experimentation with the mask values is recommended!

It is possible to modify high-pass filters so that they become directional, enhancing edges lying in a particular orientation in the original image. For example, the mask

```
 1  1  1
 1 -2  1
-1 -1 -1
```

will enhance dark to light transitions in a northerly direction.

Finally, the Laplacian filter makes edges stand out and low frequency components (i.e. large areas of similar intensity) are attenuated. The edges appear white on a black background. The transformed image usually looks very different from the original.
A typical filter of this form is:

```
-1 -1 -1
-1  8 -1
-1 -1 -1
```

This article is really intended as a starting point for your own experimentation. If you are fortunate enough to have access to a computer system with a display system of adequate quality, you may be interested to try out some of these techniques, making up your own masks and trying to explain the results!

PCSAT II - SATELLITE DISPLAY SYSTEM
Initial Review by Peter Newman

RIG are currently considering an option to market a computerised weather satellite image acquisition and display system. The system is currently under going trials by members of the RIG committee to assess whether it is suitable for sale, as a RIG product.

The system is based on the IBM PC compatible computer range, consisting of the following components:-

a. one plug-in printed circuit board
b. control software supplied on a number of floppy discs.
c. operators manual.
d. 9 pin (D) type plug.

To install the system is quite straight forward but those of you who are not confident about inserting the card into your PC then you must seek advise from a hardware expert. The board plugs into a spare slot on the PC mother board and all external connections are from the rear of the card. The card possesses a 9 pin D type connector, a speaker socket and a recess to adjust three variable resistors for initial adjustment of black base levels etc.

The software installation is simple and operates from hard to floppy disc. The significant constraint when using a hard disc is that most of the memory resident utilities must be disabled to release as much memory as possible for the satellite image, but more on that later.

There are various programs on the control disc, they include various utilities, and the acquisition/display programs. The software will run on most machine configurations CGA right through to the latest versions of super VGA. The documentation describes various constraints using particular manufacturers cards so it may be worth while ensuring that your graphics card will be suitable before you take the plunge (the most common cards are catered for, and this software author has been known to implement a less common card format on request). There are separate programs for the control software, one caters for CGA and EGA and the other for VGA and above. The main problem found with the system is that it is hungry for memory, the satellite image alone requires 512 K of store (to the benefit of picture quality, after all this is the end result). The program will display an error message on start-up if there is not enough memory available. It will let you carry on but there is little point in continuing. A full complement of 640K of RAM really a requirement.

The audio output from the receiver is fed into the card, this then is treated in much the same way as a framestore under control of the computer. The output from the analogue to digital converter is read by the software and stored in memory. The resulting images are of high quality especially when viewed on a VGA or super VGA display. The package comes complete with a demonstration to give an idea of what can be achieved by the software. There are various utilities on the program disc, one of which is the zoom option.
This will allow a fixed selection of zoom settings. It should be noted that the zoom capabilities will vary depending on the VGA card used, The popular Tseng Labs version apparently offering the most options. It would be nice to see an analogue zoom as excellently demonstrated by the Spacetech package on the Archimedes.

The software allows control of the colour palette by adjusting the levels of each colour. The effect of this is rather slow on a 8086 powered machine but worth waiting for. The images can be crudely stretched to make cloud and land features stand out.

In summary there are a number of important features of this package to note:

1. It is good value for money.
2. It has a number of features which could be tailored to meet the needs of RIG members.
3. The most significant feature of the package is that the end results are good quality satellite images.

PCSAT II continued from page 44

The images can be enhanced to use the full contrast range via the grey-scale section of the 'Set colours' routine although its use is a little tricky if your new to it. Large colour palettes are also available for manipulation but personally I prefer the detail presented in grey-scale form. Save the colour displays for impressing the neighbours! The resultant palette can then be stored in an associated palette file and recalled from disk with the original image.

For those of you with access to a HP Laserjet printer, perhaps at the works location, the print program is quite good. I think it could be further enhanced to accept images of different sizes (ie x pixels by y lines by z bits deep) as a parameter thereby extending the scope of the print program. The program accepts an image title which is printed at the bottom but the 'Timestep' line is annoying.

The pre-release manual needs a lot of work to bring it up to scratch but that will be done prior to its formal release. It will include details of the way the images are stored as there are a number of excellent image conversion/manipulation/display programs available in the public domain which RIG plan to make available to its members.

RIG members who visited Woburn will have been able to receive full/final product details and pricing information. Later in August I will be able to make available an info pack on the system, please send in an A4 sae. Additionally, members who have a VGA display can also get a demonstration disk from me, containing the NOAA program (display only) plus one image on a 3.5" disk or 2x 5.25" disks (remember the images are 512k long) for £3.00 (cheque payable to RIG) redeemable against the purchase cost of the whole system.

It is intended that RIG will be the sole distributor of this product in the UK. The price will be below £150. All enquiries with sae to me.

Phil Seaford

THE MANOEUVRING OF METEOR 3/3

I spend many hours watching the picture transmissions from the various A P T satellites and once a week I do a "predictions" run for each of the operational satellites. This means that I usually know which of the Russian satellites are in the operational system and which are "resting" !
Occasionally things are not quite as straight forward as this though.

On one occasion some months ago I noticed that Met 3/3 didn't come up at the predicted time. Several minutes later than expected, I heard a transmission and on checking whether it might be Met 3/2 being reactivated I realised that it was either a new Met or 3/3 had been adjusted for some reason. On looking on the actual picture, it was evident that it was Met 3/3, but the track was as expected but not quite at the correct time.
Sometime later I received new Kepler elements which produce perfect prediction times once more.

This event occurred again some weeks later, with an unexpected delay in the acquisition time of Met 3/3. New Keplers again bought the satellite back into line. This has never happened with the series 2 satellites and so I wondered what was going on.

I decided to try to obtain as many set of Kepler data as I could and do a plot of mean motion versus epoch. Previously I had contacted Herstmonceux, home (as it was then) of the RGO. They had shocked me by absolutely refusing to let me have any Kepler elements, and this despite the fact that some years ago I worked voluntary hours to supply them with visual satellite observations, and my wife had sat on committees with their Director!

I eventually got all the elements that I needed from Geoffrey Falworth of Penwortham who has been extremely helpful to me, locating odd Keplers for old spacecraft. Using Supercalc 4 spread sheet I entered these two parameters for Meteor 3/3 and then produced the graph shown, after some manipulation of the scaling. It then dawned on me that a "control" was needed!

I once more wrote to Geoffrey Falworth who again obliged me within days a comprehensive set of elements for 2/18 which I then plotted as shown.

The graphs show the slow incline indicating orbital decay, i.e. as time increases the drag effect on the satellite causes its period to increase and therefore its mean motion (number of orbits per day) to increase, the one for 2/18 being rather greater in absolute terms than 3/3 due to its lower orbital height. They also seem to confirm that Met 3/3 has a manoeuvring unit which is periodically activated, presumably to keep the satellite within a specific distance along its orbital plane from Met 3/2 perhaps?

This study of the orbits has provided me with a few pointers to the possibility of future analytical projects. My interest in such work has been greatly assisted by the help provided as mentioned above.

Lawrence Harris.

Dear Editor,

Some months ago I purchased a Maplin Decoder kit with the aim of displaying weather satellite information on my Amstrad 1640 PC. The kit has now been constructed and it appears to respond to the audio from VHF satellites; however, the interfacing has left me confused. I would like to talk (or write) to any RIG member who has had any experience of interfacing the Maplin unit to the Amstrad, either through a frame store of directly into the memory.

John S Roberts
2, Lomas Lea
Stannington
Sheffield
S6 6EW

MEMBERS ADS:

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Archimedes 310, 1 MByte memory, 3.5" Floppy disk drive including these extras:

Podule Extension
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Phil Seaford 0525 384419

NOAA info. Henry Neale 094 585 353

Russian, Chinese satellite info/status
Les Currington 0707 326058

Schools/ Educational enquiries,
Meteosat status and European Space Agency Colin Hall School 021 778 1311
Home 021 449 0006

Framestore technical support:
Mike Coombs 0530 243494
7.30pm - 9.30pm

Ian Gurton 0582 713770
7.30pm - 9.30pm

Dermot Dobson 22 Ramsey Road,
Headington, Oxford.

RIG Dish & Feed Horn Stockists:
see back of previous newsletters

Supplier problems co-ordinator
Henry Neale 0945 85353

RIG at Rallies 1990
Mike Coombs see above for No.

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IBM PC	Phil Seaford	see above

Please call at sensible hours ie 7.30pm - 9.30pm

RIG SHOP CORNER

NOTE: Send all orders to the Secretary at Leighton Buzzard.

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a) Assembled and tested module in tin plate box:-
£129.69 + £1.50 p&p.

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a) Basic receiver module, with LED Channel number display, fully assembled and tested
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Items below available from the secretary:
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28 page booklet entitled: Introduction to Weather Satellites & their Reception by Mike Mansfield. £2.50

Parts for **Low noise Amplifier** - see RIG 18 £30.00
None left, orders now being taken for next batch available in Autumn
David Juett YU3 i/f s/w for IBM PC & clones £6.50

Cheques payable to "Remote Imaging Group" please

FRAMESTORE PCBS:
The 001 board of the YU3 framestore design is currently being extensively revised to include buffered 8 bit A-D outputs and ctrl signals, a new Sample & Hold chip, LED activity indicators on all 8 bits and the incorporation of external controls for the A-D chip. The boards are **still** not ready (at 25 July). Enquiries incl. sae to the secretary please, a reply will be sent when they are ready for sale.

DIGISAT IBM Package

We are delighted to offer this superb interface/software package for PC compatibles. Comprising an internal plug-in interface card and software package, it accepts APT inputs directly, providing Super VGA (800 x 600 x 64) graphics. It will, however, work with other graphic environments (e.g. EGA, CGA).

Digisat has a built-in Meteosat schedule, allowing unattended downloading of images. There is an unlimited animation sequence capability (dependant only on hard-disk capacity). Direct temperature readout of 57 pre-programmed European cities is instantly available from I.R. images, and all images are automatically date and time tagged.

This excellent package has to be the best value around!

See RIG 21 for Pete Dobson's review.

Complete Software/Hardware Pkg £150

PCGOES IBM Package

Another super-value IBM PC interface/software package, providing 640 x 480 x 16 graphics (standard VGA) resolution. It lacks some of the Digisat features, but makes it up elsewhere: PCGOES does not offer animation, but it has very good hard copy printer drivers for either dot matrix or laser.

PCGOES also has a Meteosat schedule programmed in, facilitating automatic image downloading.

It features a prediction routine for polar orbiting satellites, which can be run either in real time or speeded-up.

Pete Dobson's review of IBM packages in RIG21 gives further details. **£173**

GRAPHSTORE BBC System

The MSG20 Graphstore system is the highest resolution BBC system availble, offering 512 x 512 x 128 greyscales, or 256 x 256 x 128 greyscales in 8-frame animation mode. It features zoom, (selectable 1-16) smooth X-Y scrolling, text overlaying, contrast enhancement and density-slicing algorithms. A printer dump package is now also available.

The decode software caters for NOAA and Meteosat - an upgrade will be available shortly for Soviet satellites.

MSG20 Graphstore & Software £347.78

Carriage & Ins. £7.30

AMIGASAT Amiga Package

Those who saw this superb system at its launch month at Sandown were unanimous in their pr of it. Carefully developed and refined over ne two years, this is the Amiga package by w others will be judged.

Amigasat comprises a software package toge with a hardware interface unit to plug directly your Amiga (specify model when ordering). It run under Amiga DOS 1.3 (and up), on model 1000, and 2000 machines regardless of ag version, provided there is a minimum of 1 Me RAM.

Signal demodulation is executed completel software, providing really superb Meteosat NOAAs images, (Fax and Soviet satellite upgra available shortly).

Amigasat is simplicity to drive - its contrast enha ment algorithms for example, can be re-pro using the mouse to draw the desired histogra

Because the image files are stored in standar format so that proprietary image processing ware can be utilized for painting, printing, etc.

Demonstration disc

Special Introductory Price

MSD20 Meteosat Dish & Feed

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ow Noise Downconverter with built-in sFET Preamplifier

is the lowest
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temperature
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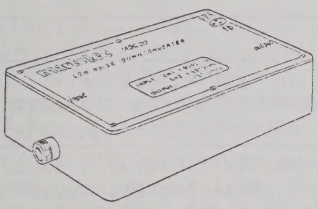

oth Meteosat channels. Output is 137.5MHz, ble for all standard VHF receivers.

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y the best system available for the Archimedes ever model Arch you have, the Spacetech le will make full use of it, providing high ution images from Meteosat, NOAA, and Soviet ecraft.

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art of a system using the MSR30 receiver, 20 dish, and MSC20 low noise downconverter ers unrivalled performance to the Archimedes r.

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Podule & Software £260

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MSR30 Synthesized Receiver

A new VHF receiver suitable for NOAA/Meteosat reception.

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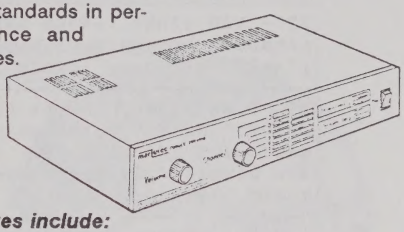

Features include:

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- *Built-in scanner with intelligent halt*
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A well-made crossed-dipole aerial for NOAA reception, cut for 137MHz operation.

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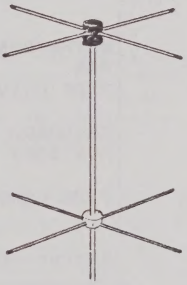

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DISK CONTROLLERS :	XT Floppy controller	£ 30.00
:	XT HD controller	£ 40.00
:	AT FD/HD cont. (2:1)	£ 80.00
EXTEND.VGA CARDS :	640*480*256 / 1024*768*16 col.	£ 115.00

>>>>> ALL PRICES INCLUDE R.I.G.MEMBER'S DISCOUNT OF 5% AND VAT <<<

ALL EQUIPMENT BRAND NEW AND GUARANTEED FOR 12 MONTHS.
PRICES/SPEC. MAY CHANGE WITHOUT NOTICE - RING FOR FURTHER DETAILS/OPTIONS/PRICES.

spacetech ATARI WEATHER SATELLITE STATION

Weather Satellite Reception system developed by Spacetech for the Archimedes which won the 1989/90 T Educational Technology Gold Award is now available for the Atari range of computers.Entirely new vare provides the follwing powerful features:

- **Compatible with European, Soviet and American satellites**
- **Entire image stored in maximum spatial resolution**
- **Time lapse animation of weather systems**
- **Automatic "hands-off" data collection**
- **Compatible with 520ST to Mega4 ST**
- **Receiver control from software**
- **2D and 3D Histogram plot**
- **False colour or 4 bit greyscale**
- **Printer support**
- **Many powerful utilities**
- **Frames may be exported to Art packages**
- **Analogue zoom with fast pan over entire image**
- **Infra-red and visible light images with cross-fade**
- **From 13 to 146 frame animation depending on model**

s package has many features that are not even closely matched by any system currently available for the ri and has been carefully thought out for the enthusiast who wants the maximum amount of flexibility for erimentation.We know it is not the first system available for the Atari but we think you will agree that g and careful development has paid off.

There are two purchase options available : the software package on its own (for the DIY hardware buff) at 0.43 and the software and decoder at £239.13. In addition Spacetech has a range of high quality VHF and F satellite receivers and antennas.

Trevor Attewell, writing about Spacetech's system in A&B nputing said:

"It is difficult to imagine an alternative package which ld offer as much as this does or to think of anything more could be asked of it. A tremendous amount of thought obviously been lavished on the design and the results are th every penny asked. See it before spending up to ten es as much on an alternative!"

...and a meteorologists view from Philip Eden (in Archive):

"Compared with the various industry-standard systems I have previously used, it is better and cheaper. Sometimes you can say one and sometimes you can say the other; very rarely both"

s system is now available for the Atari ST range and will be demonstrated at the bit Computer Show along with our wide range of Space-Science resources. A price t and further details is available on enquiry, as well as demonstration discs.

DEMONSTRATION DISCS: ANIMATION STILL-FRAME **£5.00** for two 520 or 1040 (please state)

e note: A suitable receiver and antenna is also required although the system is compatible as an upgrade isting equipment. Only weather satellite receivers are suitable,not satellite television equipment.

spacetech
21 WEST WOOLS
PORTLAND
DORSET
DT5 2EA UK
TEL. 0305 822753
FAX. 0305 860483

NOAA METEOR OKEAN

OK ! Hands up all those people that thought Timestep only supplied Meteosat equipment. Quite a lot of people we think. For education we maintain that Meteosat is the first and sometimes only satellite to use. This is why we produce an innovative Meteosat only system for schools. Our Meteosat receiver does not compromise and use a 137Mhz IF, it is therefore easier and cheaper to manufacture. For Polar Orbiters, at last, we now offer the new PROscan receiver, designed from first principles by Dave Cawley.

Throughout history weather satellites have transmitted on remarkably few frequencies. With the exception of one no longer functioning Meteor and a very short lived Chiness satellite there are only six channels. Why then would other manufactures use synthesizers ? We don't know. The advantages of crystal control are very obvious. Less noise, spectral purity, stability and ease of use are just a few reasons for using crystals. Of course this is a more expensive option, but we believe that you should have the very best receiver to take advantage of the stunning quality available from orbiting satellites, especially when using the RIG or our PC display system. Our new PROscan receiver comes with crystals for 137.30Mhz, 137.40Mhz, 137.50Mhz, 137.62Mhz, 137.80Mhz and 137.85Mhz, allowing the reception of all current and future NOAA, Meteor and Okean satellites. Two spare channels are available in the unlikely event that a new frequency comes into use.

The PROscan has an intelligent mute circuit that only responds to weather satellites and is manually defeatable. A relay is fitted to start tape recorders if required. Any number of channels can be locked out (or none), so that only satellites of interest are received. Full manual control is easy as well. For the advanced user a bidirectional port is available to interface into a computer. This will indicate the channel in use and the mute status. Or the computer may control the channel and mute.

By now you will have read how to modify every make of receiver (except Timestep) to reduce pager interference. The usual solution is to add extra IF filters. Adding IF filters cannot stop the first mixer from overload. We use a 7dBm MOSFET mixer and correct impedance matching of all filters, IF and RF. To measure performance there are only two real ways, a) to use expensive test equipment and b) to try it on air. We at Timestep use both methods. Measuring selectivity requires the use of two signal generators. We use a Marconi 2019 (£5,400.00) and a Marconi 2022 (£3,500.00) for two signal selectivity tests and a hybrid combiner. Unlike competitors we actual own this high standard of test equipment. This allows us to measure adjacent channel performance, intermodulation performance, cross-modulation performance, image rejection and IF rejection. This gives us dynamic figures that relate to the on air performance rather that simply adding up the responses of all the filters, which does not take into account all the non-linear semiconductors in the way.

Of course we do use a lot of filtering, 3 coils in the pre-amp (optional), 4 coils in the RF amp (total 7 coils at RF), 3 coils in the oscillator, 1 matching coil at first IF, 5 ceramic filters at first IF, 5 coils at second IF (total 11 IF filters) and a quadrature discriminator for linearity and threshold performance. The preamplifier is not required for short cable runs but adds extra selectivity and makes up for feeder loss on longer runs.

So, how does it perform on air ? With a radio pager mast less than 2 miles away and directly in line of sight, there is absolutely no visible or measurable disturbance. Look at our demo images to see the resolution and a complete, noise and interference free pass.

The PROscan receiver is available to RIG members only for £299.00 inc VAT and postage. The preamp for £34.50 inc and the Timestep crossed dipole for £34.95 inc. We recommend our 50M cable at £24.95 inc.

PC SOFTWARE

You may have read quite a lot about PC's, how good they are and how good the software is. Listen to the professionals though. Lawrence Harris the RIG contributor and Short Wave Magazine columnist and Les Currington G8LOK the RIG Soviet coordinator, have both chosen to use the Timestep PC software (also available from RIG). Why ? Simply because in our and their opinion it is the very best. It supports all known VGA graphic cards in all modes. It has the highest resolution (800x600x256), is easy to use, animates from Meteosat properly, and now fully supports OKEAN and METEOR even from tape with no sync track !! See the RIG shop for further details. For other products write or call for our full catalogue.

Timestep Weather Systems
Wickhambrook Newmarket CB8 8QA England
Tel. 0440 820040 Fax. 0440 820281